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Pediatrics

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General Pediatrics

Pediatric History and Physical Examination

Chief Complaint:

History of Present Illness:

Past Medical History:

Medications:

Feedings:

Immunizations:

Birth History:

Developmental History:

Family History:

Social History:

Allergies:

Physical Exam:

Assessment and Plan:

Developmental Milestones

Age	Milestone
1 month	Raises head slightly when prone; alerts to sound; regards face, moves extremities equally.
2-3 months	Smiles, holds head up, coos, reaches for familiar objects, recognizes parent.
4-5 months	Rolls front to back and back to front; sits well when propped; laughs, orientates to voice; enjoys looking around surroundings; grasps rattle, bears some weight on legs.
6 months	Sits unsupported; stranger anxiety; passes cube hand to hand; babbles; uses raking grasp; feeds self crackers.
8-9 months	Crawls, cruises; pulls to stand; pincer grasp; plays pat-a-cake; feeds self with bottle; sits without support; explores environment.

8 Developmental Milestones

12 months	Walking, talking a few words; understands "no"; says "mama/dada" discriminantly; throws objects; imitates actions, marks with crayon, drinks from a cup.
15-18 months	Comes when called; scribbles; walks backward; uses 4-20 words; builds tower of 2 blocks.
24-30 months	Removes shoes; follows 2 step command; jumps with both feet; holds pencil; knows first and last name; knows pronouns. Parallel play; points to body parts; runs; spoon feeds self; copies parents.
3 years	Dresses and undresses; walks up and down steps; draws a circle; knows more than 250 words; takes turns; shares. Group play.
4 years	Hops, skips, catches ball; memorizes songs; plays cooperatively; knows colors; copies a circle; uses plurals.
5 years	Jumps over objects; prints first name; knows address and mother's name; tolerates separation; follows game rules; draws three part man; hops on one foot.

Note: Premature infants must be age corrected for their prematurity prior to testing.

Immunizations

Recommended Schedule for Immunization of Healthy Infants and Children

Age	Immunizations	Comments
Birth	HBV	
1-2 mo	HBV	
2 mo	DTP or DTaP, Hib, OPV	DTP and Hib are available combined as Tetramune.
4 mo	DTP or DTaP, Hib, OPV	
6 mo	DTP or DTaP, (Hib)	Dose 3 of Hib is not indicated if the product for doses 1 and 2 was PedvaxHIB.
6-18 mo	HBV, OPV	
12-15 mo	Hib, MMR, VAR	Tuberculin testing may be done at the same visit if indicated.
15-18 mo	DTaP or DTP	The 4th dose of DTP or DTaP should be given 6-12 mo after the third dose of DTP or DTaP and may be given as early as 12 mo, provided that the interval between doses 3 and 4 is at least 6 mo.
4-6 y	DTaP or DTP, OPV	DTaP or DTP and OPV should be given at or before school entry. DTP or DTaP should not be given after the 7th birthday
11-12 y	MMR	MMR should be given at entry to middle school or junior high school
14-16 y	Td	Repeat every 10 yrs throughout life

HBV = Hepatitis B virus vaccine; DTP = diphtheria and tetanus toxoids and pertussis vaccine; DTaP = diphtheria and tetanus toxoids and acellular pertussis vaccine; Hib = Haemophilus influenzae type b conjugate vaccine; OPV = oral poliovirus vaccine (attenuated); MMR = live measles, mumps, and rubella viruses vaccine; Td = adult tetanus toxoid (full dose) and diphtheria toxoid (reduced dose), for children >7 y and adults; VAR = varicella virus vaccine; IPV = inactivated polio vaccine

The proposed CDC polio vaccine schedule recommends administration of inactivated polio vaccine at 2 months and 4 months of age, followed by two doses of oral polio vaccine at 12-18 months and 4-6 years of age.

10 Developmental Milestones

Recommended Schedule for Children Younger than 7 Years Not Immunized in the First Year of Life

Age	Immunizations	Comments
First visit	DTP or DTaP, Hib, HBV, MMR, OPV, VAR	If indicated, tuberculin testing may be done at the same visit. If child is ≥ 5 years, Hib is not indicated. Varicella vaccine if child has not had varicella disease.
Interval after 1st visit 1 month 2 months ≥ 8 months	DTP or DTaP, HBV DTP or DTaP, Hib, OPV DTP or DTaP, HBV, OPV	Second dose of Hib is indicated only if first dose was received when < 15 months.
4-6 years (at or before school entry)	DTP or DTaP, OPV	DTP or DTaP is not necessary if the fourth dose was given after the fourth birthday. OPV is not necessary if the third dose was given after the fourth birthday.
11-12 y	MMR	MMR should be given at entry to middle school or junior high school
10 y later	Td	Repeat every 10 yrs

Recommended Schedule for Children >7 Years Who Were Not Immunized Previously

Age	Immunizations	Comments
First visit	HBV, OPV, MMR, Td, VAR	Varicella vaccine if child has not had varicella disease.
Interval after First visit 2 months 8-14 months	HBV, OPV, Td, VAR HBV, Td, OPV	If child is ≥ 13 years old, a second varicella vaccine dose is needed 4-8 weeks after the first dose.
Back to age 11-12 y	MMR	
10 y later	Td	Repeat every 10 years

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Haemophilus Immunization

Recommendations for H influenzae type b Vaccination in Children Immunized Beginning at 2 to 6 Months of Age

Vaccine Product	Total Number of Doses	Regimens
PedvaxHIB	3	2 doses two months apart plus booster at 12 months which must be at least two months after previous dose
HibTITER	4	3 doses two months apart plus booster at 15 months which must be at least two months after previous dose

Recommendations for H influenzae type b Vaccination in Children in Whom Initial Vaccination was Delayed Until 7 Months of Age or Older

Age at Initiation	Vaccine Product	Total Doses	Regimens
7-11 mo	PedvaxHIB or HibTITER	3	2 doses at 2 months intervals plus booster at 15 months (at least 2 months after previous dose)
12-14 mo	PedvaxHIB or HibTITER	2	2 doses 2 months apart
15-59 mo	PedvaxHIB or HibTITER or ProHIBit	1	Single dose of any product
≥5 years	Immunization not recommended for this age group.		

Varicella Immunization

Recommended for:

- All children between 12-18 mo of age who have not had a documented case of varicella.
- All adolescents aged 11-12 years who have not previously received the vaccine or have not had a documented case of varicella.
- All susceptible children aged 1 year to 18 years old who are in direct contact with people at high risk for varicella related complications (e.g., immunocompromised individuals) and who have not had a documented case of varicella.

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Pediatric Symptomatic Care

Antipyretics

Analgesics/Antipyretics:

- Acetaminophen (Tylenol) 10-20 mg/kg/dose PO/PR q4-6h, max 5 doses/day or 80 mg/kg/day or 4 gm/day (whichever is smaller) **OR**
- Acetaminophen dose by age (if weight appropriate for age):

<u>AGE:</u>	<u>Mg/Dose PO q4-6h:</u>
0-3 mo	40 mg/dose
4-11 mo	80 mg/dose
1-2 yr	120 mg/dose
2-3 yr	160 mg/dose
4-5 yr	240 mg/dose
6-8 yr	320 mg/dose
9-10 yr	400 mg/dose
11-12 yr	480 mg/dose
>12 yr	325-650 mg/dose

- Preparations: Tabs: 325, 500 mg; chewable tabs: 80 mg; caplets: 160 mg, 500 mg; drops: 80 mg/0.8 ml; elixir: 120 mg/5 ml, 130 mg/5 ml, 160 mg/5 ml, 325 mg/5 ml; caplet, ER: 650 mg; suppositories: 120,325,650 mg.
- Ibuprofen (Motrin, Advil, Nuprin, Medipren, Children's Motrin), antipyretic: 5-10 mg/kg/dose PO q6-8h. [suspension: 100 mg/5 ml, tabs: 200, 300, 400, 600, 800 mg]. May cause GI distress, bleeding.

Antitussives, Decongestants and Antihistamines

Antitussives (Pure):

- Guaifenesin (Robitussin), expectorant: [syrup: 100 mg/5 ml]
 - <2 y: 12 mg/kg/day PO q4-6h prn
 - 2-6 yr: 50-100 mg PO q4h prn (max 600 mg/day)
 - 6-11 yr: 100-200 mg PO q4h prn (max 1.2 g/day)
 - ≥12 yr: 100-400 mg PO q4h prn (max 2.4 g/day)
- May irritate gastric mucosa; take with large quantities of fluids.

Decongestants:

- Pseudoephedrine (Sudafed, Novafed): [Tabs: 30, 60 mg; sustained release caps: 120 mg; syrup: 15 mg/5 ml, 30 mg/5 ml; drops: 7.5 mg/0.8 ml]
 - Children <12 yr: 4 mg/kg/day PO q6h
 - Children >12 yr and adults: 30-60 mg/dose PO q6-8h or sustained

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release 120 mg PO q12h.

-Phenylephrine (Neo-synephrine) [nasal drops: 1/8, 1/4, 1/2, 1%; nasal spray 1/4, 1/2, 1%]

Infants: Use 1/8 % drops, 1-2 drops in each nostril q3-4h

Children: Use 1/4% spray or drops, 1-2 drops/spray in each nostril q3-4h

Adults: Use 1/4-1% drops/spray, 1-2 drops/sprays in each nostril q3-4h
Discontinue use after 3 days to avoid rebound congestion.

Combination Antihistamine/Decongestant/Antitussives:

-Actifed OTC [per tab or 10 ml syrup: Triprolidine 2.5 mg, Pseudoephedrine 60 mg]

4 mth-2 y: 1.25 ml PO q6-8h

2-4 y: 2.5 ml PO q6-8h

4-6 y: 3.75 ml PO q6-8h

6-11y: 5 ml PO q6-8h

≥12 y: 10 ml PO q6-8h **OR**

4 mg pseudoephedrine/kg/day PO tid-qid

-Actifed with Codeine cough syrup [syrup per 5 ml: Codeine 10 mg, Triprolidine 1.25 mg, Pseudoephedrine 30 mg]

4 mth-2 y: 1.25 ml PO q6-8h

2-4 y: 2.5 ml PO q6-8h

4-6 y: 3.75 ml PO q6-8h

6-11y: 5 ml PO q6-8h

≥12 y: 10 ml PO q6-8h **OR**

4 mg pseudoephedrine/kg/day PO tid-qid

-Benylin DM Cough Syrup [syrup per 5 ml: Dextromethorphan 10 mg]

2-6 y: 2.5-5 mg PO q4h prn or 7.5 mg PO q6-8h prn

6-11 y 5-10 mg PO q4h prn or 15 mg PO q6-8h prn

≥12 y: 10-20 mg PO q4h prn or 30 mg PO q6-8h prn.

-Dimetane [elixir OTC: Brompheniramine 2 mg/5 ml; tab: 4 mg; SR tab: 8 mg, 12 mg]

0.5 mg/kg/day PO q6h prn **OR**

6-11 y: 2-4 mg PO q6-8h

≥12 y: 4-8 mg PO q4-6h or 8 mg SR PO q8-12h or 12 mg SR PO q12h (max 24 mg/day).

-Dimetapp [elixir per 5 ml: Brompheniramine 2 mg, Phenylpropanolamine 12.5 mg; tab: Brompheniramine 4 mg, Phenylpropanolamine 25 mg; SR tab: Brompheniramine 12 mg, Phenylpropanolamine 75 mg]

1-6 mth: 1.25 ml PO q6-8h

7-24 m: 2.5 ml PO q6-8h

2-4 y: 3.75 ml PO q6-8h

4-11 y: 5 ml PO q6-8h

≥12 y: 5-10 ml PO q6-8h

- Entex LA [SR tab: Phenylpropanolamine 75 mg, guaifenesin 400 mg]
 - >12 y: 1 tab PO bid
- Entex [liquid per 5 ml: Phenylpropanolamine 20 mg, Phenylephrine 5 mg, guaifenesin 100 mg]
 - 2-4 y: 2.5 ml PO q6h prn
 - 4-6 y: 5 ml PO q6h prn
 - 6-11 y: 7.5 ml PO q6h prn
 - ≥12 y: 10 ml PO q6h prn
- PediaCare Cold Allergy Chewable Tablets: [Pseudoephedrine 15 mg, chlorpheniramine 1 mg]
 - 6-11 y: 2 tabs PO q4-6h (max 8 tabs/day)
 - ≥12 y: 4 tabs PO q4-6h (max 16 tabs/day)
- PediaCare Night Rest Cough-Cold Liquid [per 5 ml: Pseudoephedrine 15 mg, Chlorpheniramine 1 mg, Dextromethorphan 7.5 mg]
 - 6-11 y: 10 ml PO q6-8h prn
 - ≥12 y: 20 ml PO q6-8h prn
- PediaCare Cough-Cold Liquid [per 5 ml: Pseudoephedrine 15 mg, Chlorpheniramine 1 mg, Dextromethorphan 5 mg]
 - 6-11 y: 10 ml PO q6-8h prn
 - ≥12 y: 20 ml PO q6-8h prn
- PediaCare I Children's Cough Relief Liquid [per 5 ml: Dextromethorphan 5 mg]
 - 2-5 y: 2.5-5 mg PO q4h prn or 7.5 mg PO q6-8h prn;
 - 6-11 y: 5-10 mg PO q4h prn or 15 mg PO q6-8h prn;
 - ≥12 y: 10-20 mg PO q4h prn or 30 mg PO q6-8h prn.
- PediaCare 3 Children's Cold Relief Liquid [per 5 ml: Dextromethorphan 5 mg, chlorpheniramine 1 mg, pseudoephedrine 15 mg]
 - 4-5 mg/kg/day of pseudoephedrine component PO q6h prn.
- Phenergan with Codeine [per 5 ml: Promethazine 6.25 mg, Codeine 10 mg, phenylephrine 5 mg]
 - 2-6 y: 1.25-2.5 ml PO q4-6h prn
 - 6-11 y: 2.5 ml PO q4-6h prn
 - ≥12 y: 5 ml PO q4-6h prn

Adults: 5-10 ml q4-6h prn (max 120 mg codeine per day)
- Phenergan with Dextromethorphan [per 5 ml: Promethazine 6.25 mg, Dextromethorphan 15 mg]
 - 2-6 y: 1.25 ml PO q4-6h prn
 - 6-11 y: 2.5 ml PO q4-6h prn
 - ≥12 y: 5 ml PO q4-6h prn
- Polyhistine DM [per 5 ml: Phenylpropanolamine 12.5 mg, Brompheniramine 2 mg, Dextromethorphan 10 mg]
 - 1-6 mos: 1.25 ml PO tid-qid prn
 - 7-24 mos: 2.5 ml PO tid-qid prn
 - 2-4 y: 3.75 ml PO tid-qid prn

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4-11 y: 5 ml PO tid-qid prn

≥12 y: 10 ml PO tid-qid prn.

-Polyhistine CS [per 5 ml: Phenylpropanolamine 12.5 mg, Brompheniramine 2 mg, Codeine 10 mg]
1-6 mos: 1.25 ml PO tid-qid prn
7-24 mos: 2.5 ml PO tid-qid prn
2-4 y: 3.75 ml PO tid-qid prn
4-11: 5 ml PO tid-qid prn
≥12 y: 10 ml PO tid-qid prn.

-Robitussin AC [per 5 ml: Guaifenesin 100 mg, Codeine 10 mg]
2-6 yrs: 2.5 ml PO q4h prn
6-11 yrs: 5 ml PO q4h prn
≥12 yrs: 10 ml PO q4-6h prn.

-Robitussin CF [per 5 ml: Guaifenesin 100 mg, Dextromethorphan 10 mg, Phenylpropanolamine 12.5 mg]
2-6 yrs: 2.5 ml PO q4h prn
6-11 yrs: 5 ml PO q4h prn
≥12 yrs: 10 ml PO q4-6h prn.

-Robitussin DM [per 5 ml: Guaifenesin 100 mg, Dextromethorphan 15 mg]:
2-6 y: 2.5-5 ml PO q4h prn, max 10 ml/day
6-11 y: 5-10 ml PO q4h prn, max 20 ml/day
≥12 y: 10-20 ml PO q4h prn, max 40 ml/day.

-Rondec drops [per 1 ml: carboxamine maleate 2 mg, pseudoephedrine 25 mg]
4-5 mg pseudoephedrine/kg/day PO q6h prn; **OR**
1-3 m: 1/4 dropperful (1/4 ml) PO q6h prn
3-6 m: 1/2 dropperful (1/2 ml) PO q6h prn
6-9 m: 3/4 dropperful (0.75 ml) PO q6h prn
9-18 m: 1 dropperful (1 ml) PO q6h prn.

-Rondec syrup [per 5 ml: Pseudoephedrine 60 mg, carboxamine 4 mg]
4-5 mg pseudoephedrine/kg/day PO q6h prn.

-Rondec DM drops [per ml: carboxamine maleate 2 mg, pseudoephedrine 25 mg, dextromethorphan 4 mg]
4-5 mg pseudoephedrine/kg/day PO q6h prn **OR**
1-3 m: 1/4 dropperful (1/4 ml) PO q6h prn
3-6 m: 1/2 dropperful (1/2 ml) PO q6h prn
6-9 m: 3/4 dropperful (0.75 ml) PO q6h prn
9-18 m: 1 dropperful (1 ml) PO q6h prn.

-Rondec DM syrup [per 5 ml: Carboxamine 4 mg, pseudoephedrine 60 mg, dextromethorphan 15 mg]
4-5 mg pseudoephedrine/kg/day PO q6h prn.

-Sudafed Plus [per 5 ml: pseudoephedrine 30 mg, chlorpheniramine 2 mg; tab: pseudoephedrine 60 mg, chlorpheniramine 4 mg]
4-5 mg pseudoephedrine/kg/day PO q6h prn.

- Sudafed Cough Syrup [per 5 ml: Dextromethorphan 5 mg, guaifenesin 100 mg, pseudoephedrine 15 mg]
4-5 mg pseudoephedrine/kg/day PO q6h prn.

Analgesia and Sedation

Analgesics:

- Acetaminophen/Codeine [per 5 ml: Acetaminophen 120 mg and Codeine 12 mg; or tabs Tylenol #2: 15 mg codeine/300 mg acetaminophen; #3: 30 mg codeine/300 mg acetaminophen; #4: 60 mg codeine/300 mg acetaminophen]
0.5-1.0 mg codeine/kg/dose PO q4h prn.
- Acetaminophen (Tylenol) 10-15 mg/kg PO/PR q4-6h prn
- Acetaminophen/Hydrocodone [elixir per 5 ml: hydrocodone 2.5 mg, acetaminophen 167 mg]
Tab:
 - Hydrocodone 2.5 mg, acetaminophen 500 mg
 - Hydrocodone 5 mg, acetaminophen 500 mg
 - Hydrocodone 7.5 mg, acetaminophen 500 mgChildren: 0.6 mg hydrocodone/kg/day PO q6-8h prn
 - <2 y: do not exceed 1.25 mg/dose
 - 2-12 y: do not exceed 5 mg/dose
 - >12 y: do not exceed 10 mg/dose
- EMLA cream (eutectic mixture of local anesthetics) [5 gm, 30 gm: 2.5% lidocaine and 2.5% prilocaine]. Apply and cover with occlusive dressing at least 1 hour (max 4 hours) prior to procedure (e.g. lumbar puncture, venipuncture, marrow aspiration).
- Fentanyl 1-2 mcg/kg IV q1-2h prn or 1-3 mcg/kg/hr continuous IV infusion.
- Hydromorphone (Dilaudid) 0.015 mg/kg IV/IM/SC q3-4h or 0.0075 mg/kg/hr continuous IV infusion titrated as necessary for pain relief or 0.03-0.08 mg/kg PO q6h prn.
- Ibuprofen (Children's Motrin, PediaProfen) [100 mg/5 ml; tabs 200, 300, 400, 600, 800 mg]
>6 mth: 5-10 mg/kg/dose PO q6-8h
- Ketamine 4 mg/kg IM; 0.5-1 mg/kg IV
Comment: Onset is approximately 30 seconds, duration is approximately 5-15 minutes.
- Meperidine (Demerol) 1 mg/kg IV/IM q2-3h prn.

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-Morphine 0.05-0.1 mg/kg IV q2-4h prn or 0.02-0.06 mg/kg/hr continuous IV infusion; or 0.1-0.15 mg/kg IM/SC q3-4h.

Sedation:

DPT Cocktail:

- Meperidine (Demerol) 1-2 mg/kg IM **AND**
- Promethazine (Phenergan) 0.5-1 mg/kg IM **AND**
- Chlorpromazine (Thorazine) 0.5-1 mg/kg IM.

Extremely variable effect, onset, and duration of action. All three drugs may be mixed together in one syringe and administered as a single IM injection.

Fentanyl and Midazolam Sedation:

- Fentanyl 1 mcg/kg IV slowly, may repeat to total of 3 mcg/kg **AND**
- Midazolam (Versed) 0.05-0.1 mg/kg slow IV [inj 1 mg/ml, 5 mg/ml]. Naloxone and flumazenil should be readily available for reversal if necessary.

Other Sedatives:

- Lorazepam (Ativan) 0.05-0.10 mg/kg/dose IM/IV/PO, max 4 mg.
- Diazepam (Valium) 0.2-0.5 mg/kg/dose PO/PR or 0.05-0.2 mg/kg/dose IM/IV, max 10 mg.
- Midazolam (Versed) 0.08-0.2 mg/kg/dose IM/IV over 10-20 min, max 5 mg; or 0.2-1.0 mg/kg/dose PO x 1 (max 15 mg) 30-45 min prior to procedure; or 0.2 mg/kg intranasal (using 5 mg/ml injectable solution, insert into nares with needleless tuberculin syringe.)
- Chloral Hydrate 25-100 mg/kg/dose PO, PR (max 1.5 gm/dose), allow 30min for absorption.
- Promethazine (Phenergan) 0.5-1 mg/kg/dose IM or slow IV over 20 min, max 50 mg.
- Chlorpromazine (Thorazine) 0.5-1 mg/kg/dose IM or slow IV over 20min (max 50 mg/dose).
- Hydroxyzine (Vistaril) 0.5-1 mg/kg/dose IM, max 50 mg.
- Methohexitol (Brevital)
 - IM: 5-10 mg/kg
 - IV: 1-2 mg/kg
 - PR: 25 mg/kg (max 500 mg/dose)
[inj: 500 mg]
- Thiopental (Pentothal): Sedation, rectal: 5-10 mg/kg; seizures, IV: 2-3 mg/kg

Antiemetics

- Chlorpromazine (Thorazine) 0.25-1 mg/kg/dose (max 50 mg) slow IV over 20 min/IM/PO q4-8h prn [inj: 25 mg/ml, syrup: 10 mg/5 ml, oral concentrate 30 mg/ml; tabs: 10,25,50,100,200 mg; supp: 25,100 mg].
- Dimenhydrinate (Dramamine) ≥12 yrs: 5 mg/kg/day IM/IV/PO q6h prn, max 300 mg; not recommended in <12y due to high incidence of extrapyramidal side effects [oral liquid 12.5 mg/4 ml; cap: 50 mg; tab: 50 mg; inj: 50 mg/ml].
- Diphenhydramine (Benadryl) 1 mg/kg/dose IM/IV/PO q6h prn [oral liquid 12.5 mg/5 ml; tabs: 25, 50 mg; inj: 10, 50 mg/ml; caps: 25, 50 mg]
- Prochlorperazine (Compazine) ≥12 yrs: 0.1-0.15 mg/kg/dose IM, max 10 mg x 1 dose; 0.4 mg/kg/day PO or pr q6-8h, max 40 mg/day oral or 50 mg/day rectal; not recommended in <12y due to high incidence of extrapyramidal side effects [tabs: 5, 10, 25 mg; SR caps: 10, 15, 30 mg; syrup: 5 mg/5 ml; supp: 2.5, 5, 25 mg ; inj: 5 mg/ml].
- Promethazine (Phenergan) 0.25-1 mg/kg/dose (max 50 mg) PO/IM/IV over 20 min or PR q4-6h prn [syrup 6.25 mg/5 ml, 25 mg/5 ml; tabs: 12.5, 25, 50 mg; supp: 12.5, 25, 50 mg; inj: 25,50 mg/ml].
- Trimethobenzamide (Tigan) 15 mg/kg/day IM/PO/PR q6-8h [caps: 100, 250 mg; supp: 100, 200 mg; inj: 100 mg/ml].

Post-Operative Nausea and Vomiting:

- Ondansetron (Zofran) 0.15 mg/kg (max 4 mg) IV x 1
- Droperidol 0.01-0.05 mg/kg IV/IM q4-6h prn (max 5 mg) [inj: 2.5 mg/ml]

Chemotherapy-Induced Nausea:

- Ondansetron (Zofran)
 - 0.15 mg/kg/dose IV 30 minutes before chemotherapy and repeated 4 hr and 8 hr later (total of 3 doses) **OR**
 - 0.45 mg/kg/24 hr as a continuous IV infusion **OR**
 - Oral:
 - <0.32 m²: 1 mg PO three times daily
 - 0.3-0.6 m²: 2 mg PO three times daily
 - 0.6-1 m²: 3 mg PO three times daily
 - >1 m²: 4 mg PO three times daily **OR**
 - 4-11 y: 4 mg PO three times daily
 - >11 y: 8 mg PO three times daily
 - [inj: 2 mg/ml; tab: 4, 8 mg (injectable solution may be given orally)]
- Dexamethasone
 - 10 mg/m²/dose (max 20 mg) IV x 1, then 5 mg/m²/dose (max 10 mg) IV q6h prn
 - [inj: 4 mg/ml, 10 mg/ml]

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-Granisetron (Kytril)

10-20 mcg/kg IV given just prior to chemotherapy (single dose) [inj: 1 mg/ml]

Adults (oral) 1 mg PO bid [tab: 1 mg]

-Metoclopramide (Reglan)

1 mg/kg/dose IV q4h prn.

Pretreatment with diphenhydramine 1 mg/kg IV is recommended to decrease the risk of extrapyramidal reactions.

[inj: 5 mg/ml]

-Dronabinol (Marinol)

5 mg/m²/dose PO 1-3 hrs prior to chemotherapy then q4h prn afterwards.

May titrate up in 2.5 mg/m²/dose increments to max of 15 mg/m²/dose.

[cap: 2.5, 5, 10 mg]

Cardiology

Pediatric Advanced Life Support

General Measures:

Begin CPR, 100% oxygen, assess rhythm and pulse. Assess airway, breathing, and circulation; consider nasogastric tube if supportive ventilation required for longer than 2 min.

Intubation:

Age:	ETT	Laryngoscope Blade	NG Tube Size
Premature	2.0-2.5	0	8
Newborn >2 kg	3.0-3.5	1	10
Infant	3.5-4.0	1	10
12 mo	4.0-4.5	1.5	12
36 mo	4.5-5.0	2	12-14
6 yr	5.0-5.5	2	14-16
10 yr	6.0-6.5	2	16-18
Adolescent	7.0-7.5	3	18-20
Adult	7.5-8.0	3	20

Uncuffed ET tube in children <8 yrs.

Straight laryngoscope blade if <6-10 yrs; curved blade if older.

1. **Preoxygenate** with 100% oxygen via air bag and mask.
2. **Atropine** 0.02 mg/kg IV or ET (min 0.1 mg; max 0.5 mg for child, max 1 mg for adolescent).
3. **Lorazepam (Ativan)** 0.1 mg/kg IV/IM (max 4 mg) **OR**
Diazepam (Valium) 0.2-0.5 mg/kg IV/IM (max 10 mg) **OR**
Midazolam (Versed) 0.1 mg/kg IV/IM (max 5 mg)
4. **Succinylcholine** 1-2 mg/kg IV (max 100 mg) or 2-4 mg/kg IM (max 150 mg) **OR**
Pancuronium: 0.06-0.1 mg/kg/dose IV **OR**
Vecuronium 0.1 mg/kg IV

Supraventricular Tachycardia:

1. **Mild to Moderate Severity:** Apply vagal stimulation by neck extension (no direct pressure on carotid) or ice bag to face for 15-20 seconds. If no conversion, give Adenosine 0.1 mg/kg (max 6 mg) rapid IV push with EKG monitoring. May double dose once to 0.2 mg/kg (max 12 mg) and repeat every 2 minutes prn until termination of SVT.

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2. **Severe (Patients who show evidence of cardiovascular compromise):** Synchronized DC cardiovert with 0.5 J/kg. If conversion to sinus rhythm does not occur, synchronized cardiovert with 1 J/kg.
3. **Maintain oxygenation and ventilation.**

Asystole:

1. Start CPR, and confirm asystole with 2 leads. Secure airway. Hyperventilate with 100% oxygen.
2. **Epinephrine** 0.01 mg/kg (0.1 ml/kg of 0.1 mg/ml = 1:10,000) IV/IO. If pulseless cardiac arrest persists, a second dose of 0.1 mg/kg (0.1 ml/kg of 1 mg/ml = 1:1000) is given. If a response to the first 0.01 mg/kg dose occurs, repeat same dose q3-5 minutes. Consider starting continuous infusion of 0.05-1 mcg/kg/min. For endotracheal route, give 0.1 mg/kg (0.1 ml/kg of 1 mg/ml = 1:1000) diluted with normal saline to final volume of 3-5 ml. Repeat q3-5 min.
3. Consider **External or Transvenous Pacing**, and consider **Bicarbonate** for suspected or proven acidosis, 1 mEq/kg IV/IO [1 mEq/ml sln diluted 1:1 with sterile water].

Sinus Bradycardia:

Rate <60 BPM or less than normal for age with poor perfusion, even if BP is normal; Initiate 100% oxygen, chest compressions.

1. **Epinephrine** 0.01 mg/kg (0.1 ml/kg of 0.1 mg/ml = 1:10,000) IV/IO q5min, then consider 0.05-1 mcg/kg/min continuous IV infusion. For endotracheal route, 0.1 mg/kg (0.1 mg/ml of 1 mg/ml = 1:1000) diluted with normal saline to final volume of 3-5 ml.
2. **Atropine** 0.02 mg/kg (0.2 ml/kg of 0.1 mg/ml = 1:10,000) IV/IO q5 minutes (minimum 0.1 mg; maximum 0.5 mg for child, 1 mg for adolescent). For endotracheal use, use 0.04-0.06 mg/kg (0.4-0.6 ml/kg of 0.1 mg/ml = 1:10,000) diluted with normal saline to final volume of 3-5 ml.
3. **Isoproterenol** 0.05-1.5 mcg/kg/min continuous IV infusion, begin with 0.05 mcg/kg/min and increase every 5-10 min by 0.05-0.1 mcg/kg/min until desired effect or tachycardia > 180 bpm or arrhythmia occurs. Max dose: 2 mcg/kg/min. For use in bradycardia due to heart block only
4. **External or Esophageal Pacing**

Ventricular Fibrillation:

1. Ventilate with 100% oxygen. Initiate chest compressions and continue until defibrillation is performed. Vascular access should be obtained, provided that defibrillation is not delayed.
2. Defibrillate with **unsynchronized 2 Joules/kg**. If necessary double to 4 Joules/kg and defibrillate two more times.
3. **Epinephrine:** First dose 0.01 mg/kg (0.1 ml/kg of 0.1 mg/ml = 1:10,000)

IV/IO q 3-5 min. For endotracheal route, 0.1 mg/kg (0.1 mg/ml of 1 mg/ml = 1:1000) diluted with normal saline to final volume of 3-5 ml. Second and subsequent doses 0.1 mg/kg (0.1 ml/kg of 1 mg/ml = 1:1000) IV/IO/ET.

4. **Defibrillate** with unsynchronized 4 Joules/kg 30-60 seconds after each medication.
5. **Lidocaine** 1 mg/kg IV/IO bolus, may repeat bolus x 1, then consider 10-50 mcg/kg/min continuous IV infusion.
6. **Defibrillate**.
7. **Bretylium** 5 mg/kg IV first dose, 10 mg/kg IV second dose.
Defibrillate after each dose with unsynchronized 4 joules/kg.

Unstable Ventricular Tachycardia with Pulse:

1. Intubate and ventilate with 100% oxygen, and sedate patient if time permits (midazolam 0.1 mg/kg IV).
2. If it will not delay cardioversion, administer lidocaine 1 mg/kg IV.
3. Cardiovert with **Synchronized 0.5 Joules/kg**, may repeat with 1 J/kg.
4. **Lidocaine** 1 mg/kg IV bolus (max 100 mg), then 20-50 mcg/kg/min continuous infusion IV. Administer bolus prior to cardioversion if time permits.
5. If no conversion, **Cardiovert Synchronized** at 1 J/kg, or if **recurrent ventricular tachycardia**, **Cardiovert** again starting at previously successful energy level.
6. **Bretylium** 5 mg/kg (max 500 mg) rapid IV over 1-2min, may double dose and repeat in 20 min.

***If unconscious, pulmonary edema, hypotensive, use unsynchronized cardioversion and bypass sedation.**

1. Synchronized cardioversion is indicated. If clinical condition permits, secure vascular access and give lidocaine 1 mg/kg IV. Do not delay cardioversion in an unstable child.
2. Consider lidocaine infusion if ventricular arrhythmias are thought to be associated with myocarditis or structural heart disease.
3. Consider bretylium if defibrillation and lidocaine are ineffective.

Stable Ventricular Tachycardia with Pulse:

1. **Lidocaine** 1 mg/kg (max 100 mg) IV, then 20-50 mcg/kg/min continuous infusion IV **OR**
2. **Procainamide** 3-6 mg/kg slow IV, may repeat to max 15 mg/kg or 100 mg; infusion: 20-80 mcg/kg/min IV.
3. If no conversion, or if chest pain, dyspnea, or MI, use synchronized cardioversion as in unstable ventricular tachycardia.

Post Arrest Stabilization:

-Epinephrine 0.05-1 mcg/kg/min continuous IV infusion.

26 Congestive Heart Failure

- Dopamine 2-20 mcg/kg/min continuous IV infusion.
- Dobutamine 2-20 mcg/kg/min continuous IV infusion.

Congestive Heart Failure

- 1. Admit to:**
- 2. Diagnosis:** Congestive Heart Failure
- 3. Condition:**
- 4. Vital signs:** Call MD if:
- 5. Activity:**
- 6. Nursing:** Daily weights, inputs and outputs
- 7. Diet:** Low salt diet
- 8. IV Fluids:**
- 9. Special Medications:**
 - Oxygen 2-4 L/min by NC.
 - Furosemide (Lasix) 1 mg/kg/dose (usual max 80 mg PO, 40 mg IV) IV/IM/PO q6-12h prn, may increase to 2 mg/kg/dose IV/IM/PO [tabs: 20, 40, 80 mg; inj: 10 mg/ml; oral liquid: 10 mg/ml, 40 mg/5 ml] **OR**
 - Bumetanide (Bumex) 0.015-0.1 mg/kg PO/IV/IM q24h (max 10 mg/day) [tabs: 0.5, 1, 2 mg; inj: 0.25 mg/ml].

Digoxin:

Before administration: baseline ECG, serum electrolytes (particularly potassium), estimation of renal function

Initial digitalization establishes the body stores, and is given over 24 hours in three divided doses: 1/2 TDD at time 0 hours, 1/4 TDD in 8-12 hours, and 1/4 TDD 8-12 hours later (TDD is total digitalizing dose).

Maintenance therapy is then started.

Total Digitalizing Dose

	PO	IV
Premature infant	15-40 mcg/kg	10-30 mcg/kg
Full term newborn (0-2 weeks)	30 mcg/kg	20-25 mcg/kg
2 wks-2 y	40-50 mcg/kg	30-40 mcg/kg
2-10 y	30-40 mcg/kg	25-30 mcg/kg
>10 y	1.5-2 mg	10 mcg/kg (max 1 mg)

Maintenance digoxin dose

	PO	IV
Preterm neonate	4-12 mcg/kg/day	4-9 mcg/kg/day
Term neonate (0-2 wks)	8-10 mcg/kg/day	6-8 mcg/kg/day
2 weeks - 2 y	10-12 mcg/kg/day	8-10 mcg/kg/day
2-10 y	8-10 mcg/kg/day	6-8 mcg/kg/day
>10 y	5 mcg/kg/day	2-3 mcg/kg/day

Adult 0.125-0.5 mg/day 0.1-0.4 mg/day
 [caps: 50, 100, 200 mcg; tabs: 0.125, 0.250, 0.500 mg; oral elixir: 50 mcg/ml; inj: 100, 250 mcg/ml].
 Divide bid if <10 yrs or qd if ≥10 yrs.

Other Inotropic Agents:

- Dopamine 2-20 mcg/kg/min continuous IV infusion, titrate cardiac output and BP.
- Dobutamine 2-20 mcg/kg/min continuous IV infusion, max of 40 mcg/kg/min.
- Nitroglycerine 0.5 mcg/kg/min continuous IV infusion, may increase by 1 mcg/kg q20min; titrate to MAP >70 mm Hg, systolic >90 mm Hg; usual max 5 mcg/kg/min.
- Captopril (Capoten), neonates: 0.05-0.1 mg/kg/dose PO q6-8h; infants: 0.15-0.3 mg/kg/dose PO q8h. Children 0.5 mg/kg/dose PO q6-12h. Titrate as needed up to max of 6 mg/kg/day [tabs: 12.5,25,50,100 mg]. Tablets can be crushed and made into suspension for small dosages, but must be used immediately as drug degrades quickly once dissolved.
- KCL 1-4 mEq/kg/day PO.

10. Extras and X-rays: CXR PA and LAT, ECG, echocardiogram.

11. Labs: ABG, SMA 7, CBC, cardiac enzymes, iron studies, digoxin level. UA.

Atrial Fibrillation and Atrial Flutter

1. Admit to:

2. Diagnosis: Atrial fibrillation / flutter

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing:

7. Diet:

8. IV Fluids:

9. Special Medications:

Cardioversion (if unstable or refractory to drug Tx):

1. If unstable, **Synchronized Cardiovert** immediately. In stable patient with atrial fibrillation, consider starting quinidine or procainamide 24-48h prior.
 - Quinidine gluconate, 2-10 mg/kg/dose IV q3-6h
 - Procainamide, loading dose 3-6 mg/kg IV over 5 min (max 100 mg); may repeat every 5-10 minutes to max of 15 mg/kg (max 500 mg)
 - Maintenance 20-80 mcg/kg/min continuous IV infusion (max 2 gm/24 hrs)
2. Midazolam (Versed) 0.1 mg/kg IV over 2 min, repeat prn until amnesic.

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3. Synchronous cardioversion: 0.5-1 Joules/kg. Consider esophageal overdrive pacing.

Rate Control:

Digoxin:

Initial digitalization establishes the body stores, and is given over 24 hours in three divided doses: 1/2 TDD at time 0 hours, 1/4 TDD in 8-12 hours, and 1/4 TDD 8-12 hours later (TDD is total digitalizing dose).

Maintenance therapy is then started.

Total Digitalizing Dose

	<u>PO</u>	<u>IV</u>
Premature infant	15-40 mcg/kg	10-30 mcg/kg
Full term newborn (0-2 weeks)	30 mcg/kg	20-25 mcg/kg
2 wks-2 y	40-50 mcg/kg	30-40 mcg/kg
2-10 y	30-40 mcg/kg	25-30 mcg/kg
>10 y	1.5-2 mg	10 mcg/kg (max 1 mg)

Maintenance Digoxin Dose

	<u>PO</u>	<u>IV</u>
Preterm neonate	4-12 mcg/kg/day	4-9 mcg/kg/day
Term neonate (0-2 wks)	8-10 mcg/kg/day	6-8 mcg/kg/day
2 weeks - 2 y	10-12 mcg/kg/day	8-10 mcg/kg/day
2-10 y	8-10 mcg/kg/day	6-8 mcg/kg/day
>10 y	5 mcg/kg/day	2-3 mcg/kg/day
Adult	0.125-0.5 mg/day	0.1-0.4 mg/day

Divide bid if <10 yrs or qd if ≥10 yrs.

[caps: 50, 100, 200 mcg; tabs: 0.125, 0.250, 0.500 mg; oral elixir: 50 mcg/ml; inj: 100, 250 mcg/ml].

Other Rate Controlling Agents:

- Propranolol 0.01-0.1 mg/kg slow IV push over 10 minutes, repeat q6-8h prn (max 1 mg/dose) or 0.5-4 mg/kg/day PO q6-8h (max 60 mg/day) [tabs 10, 20, 40, 60, 80, 90 mg; inj 1 mg/ml; oral solutions: 4 mg/ml, 8 mg/ml, 80 mg/ml].

Pharmacologic Conversion (after rate control):

- Procainamide: Loading dose of 2-6 mg/kg/dose IV over 5 min, then 20-80 mcg/kg/min IV infusion (max 100 mg/dose or 2 gm/24h). Oral maintenance, 15-50 mg/kg/day PO q3-6h (max 4 gm/d). [tab: 250, 375, 500 mg; inj: 100 mg/ml, 500 mg/ml; tab, SR: 250, 500, 750, 1000 mg; caps: 250, 375, 500 mg]

- 10. Extras and X-rays:** Portable CXR, ECG, 24h Holter; echocardiogram.

11. Labs: CBC, SMA 7, UA, ABG. Serum drug levels.

Hypertensive Crisis

1. Admit to:

2. Diagnosis: Hypertensive Crisis (diastolic and/or systolic BP >95% for age on 3 separate occasions)

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing: ECG, daily weights, inputs and outputs.

7. Diet:

8. IV Fluids:

9. Special Medications:

-Nitroprusside (Nipride) 0.5-10 mcg/kg/min continuous IV infusion. Titrate to desired blood pressure. Cyanide and thiocyanate toxicity may develop with prolonged use or in renal impairment.

-Labetalol (Trandate) 0.2 mg/kg (max 20 mg) IV over 2 min or 0.4-1 mg/kg/hr continuous infusion.

-Hydralazine (Apresoline) 0.1-0.2 mg/kg/dose slow IV q2-6h (max 20 mg/dose).

-Enalaprilat (Vasotec IV) 5-10 mcg/kg/dose IV q8-24h prn.

-Nifedipine (Procardia, Adalat) 0.25-0.5 mg/kg (max 10 mg) PO, may repeat q1-3h prn [10,20 mg capsules].

10. Extras and X-rays: CXR, ECG, CT, renal Doppler and ultrasound, abdominal flat plate. Hypertensive intravenous pyelography (1, 2, 3 min x-ray).

11. Labs: CBC, SMA 7, BUN, creatinine, fresh urine for UA with micro. Urine specific gravity, thyroid panel, 24h urine for metanephrine, serum catecholamines; ANA, complement, ASO titer; toxicology screen.

Pulmonology

Asthma

1. Admit to:
2. Diagnosis: Exacerbation of asthma
3. Condition:
4. Vital signs: Call MD if:
5. Activity:
6. Nursing: Pulse oximeter, measure peak flow rate for older patients.
7. Diet:
8. IV Fluids: D5 1/4 NS or D5 1/2 NS as required.

9. Special Medications:

-Oxygen humidified prn, 1-6 L/min by NC or 25-80% by mask, keep sat >92%.

Nebulized Beta 2 Agonist:

-Albuterol (Ventolin) (0.5% = 5 mg/ml soln) nebulized 0.2-0.5 ml in 2 ml NS q2-6h and prn; may also be given by continuous aerosol.

Corticosteroids:

-Methylprednisolone (Solu-Medrol) 2 mg/kg/dose IV q6h x 4 doses, then 1 mg/kg/dose IV q6h x 3-5 days **OR**
 -Prednisolone 1-2 mg/kg/day PO q12-24h x 3-5 days [syrup: 5 mg/5 ml; Prelone 15 mg/5 ml] **OR**
 -Prednisone 1-2 mg/kg/day PO q12-24h x 3-5 days [tabs: 1, 2, 5, 10, 20, 50 mg; oral solution: 1 mg/ml, 5 mg/ml].

Aminophylline and Theophylline:

-Infrequently used; must follow theophylline levels (desired therapeutic range 10-20 mcg/ml). Erythromycin or carbamazepine may increase serum theophylline levels.
 -Aminophylline loading dose, 5-6 mg/kg **total** body weight in D5 1/4 NS IV over 20-30 min [1 mg/kg of aminophylline will raise levels by 2 mcg/ml].
 -Aminophylline maintenance, continuous IV infusion (in D5 1/4 NS): Dosed based on ideal body weight
 1-6 mth: 0.5 mg/kg/h
 6-12 mth: 0.6-0.75 mg/kg/h
 12 mth-10 y: 1.0 mg/kg/h
 10-16 y: 0.75-0.9 mg/kg/h
 >16 y: 0.7 mg/kg/h **OR**
 -Theophylline PO loading dose of 6 mg/kg, then maintenance of 80% of total daily maintenance IV aminophylline dose in 2-4 doses/day (depending on product).
 1-6 mth: 9.6 mg/kg/day theophylline.

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6-12 mth: 11.5-14.4 mg/kg/day theophylline.

12 mth-10 y: 19.2 mg/kg/day theophylline.

10-16 y: 14.4-17.3 mg/kg/day theophylline.

>16 y: 10 mg/kg/day theophylline.

-Give theophylline as sustained release theophylline preparation: q8-12h or liquid immediate release: q6h.

-Slo-Phyllin Gyrocaps, may open caps and sprinkle on food [60, 125, 250 mg caps] q8-12h **OR**

-Slobid Gyrocaps, may open caps and sprinkle on food [50, 75, 100, 125, 200, 300 mg caps]

-Theophylline oral liquid: 80 mg/15 ml, 10 mg/ml] q6-8h.

-Theo-Dur [100, 200, 300, 450 mg tabs; scored, may cut in half, but do not crush].

-Theophylline Products

Cap: 100, 200 mg

Cap, SR: 50, 60, 75, 100, 125, 130, 200, 250, 260, 300 mg

Liquid: 80 mg/15 ml, 10 mg/ml

Tab: 100, 125, 200, 300 mg

Tab, SR: 50, 75, 100, 125, 130, 200, 250, 260, 300, 400, 450, 500 mg

Beta 2 Agonist, Corticosteroid, and Cromolyn Metered Dose Inhalers:

-Albuterol (Ventolin, Proventil) or Metaproterenol (Alupent) MDI 2 puffs q1-6h prn with spacer and mask.

-Beclomethasone (Beclovent) MDI 1-2 puffs qid or 4 puffs bid (max 16 puffs/day) with spacer and mask, 5 min after bronchodilator, followed by gargling with water.

-Triamcinolone (Azmacort) MDI 1-2 puffs qid or 4 puffs bid (max 16 puffs/d).

-Flunisolide (AeroBid) MDI 1-2 puffs bid-qid (max 8 puffs/d).
-Cromolyn sodium (Intal) MDI 2-4 puffs qid-tid; or powder 20 mg/capsule bid-qid; or nebulized 1% sln, 1 amp (2 ml, 20 mg) q6h. Not recommended for acute treatment since duration of onset is 2-4 weeks.

Oral Beta 2 Agonists:

-Albuterol liquid (Proventil) 2-6 years: 0.1-0.2 mg/kg/dose PO q6-8h or 6-12 years: 2 mg PO tid-qid; >12 years: 2-4 mg PO tid-qid [soln: 2 mg/5 ml; tab: 2, 4 mg; ER tab: 4 mg] **OR**

-Metaproterenol liquid (Alupent) 0.3-0.5 mg/kg/dose PO q6-8h. 6-9 years: 10 mg PO q6-8h; >9 years: 20 mg PO q6-8h. [soln: 10 mg/5 ml; tab: 10, 20 mg]

10. Extras and X-rays: CXR, pulmonary function test, skin allergy testing. PEFR as needed and may be helpful in older patients.

11. Labs: CBC, CBG/ABG. Urine antigen screen, UA.

Allergic Rhinitis and Conjunctivitis

Antihistamines:

- Actifed OTC [per tab or 10 ml syrup: triprolidine 2.5 mg, pseudoephedrine 60 mg]
 - 4 mg pseudoephedrine/kg/day po tid-qid **OR**
 - 4 m-2 y: 1.25 ml PO q6-8h
 - 2-4 y: 2.5 ml PO q6-8h
 - 4-6 y: 3.75 ml PO q6-8h
 - 6-11y: 5 ml PO q6-8h
 - >12 y: 10 ml PO q6-8h.
- Dimetapp [elixir per 5 ml: Brompheniramine 2 mg, Phenylpropanolamine 12.5 mg; tab: Brompheniramine 4 mg, Phenylpropanolamine 25 mg; SR tab: Brompheniramine 12 mg, Phenylpropanolamine 75 mg]
 - 1-6 mth: 1.25 ml PO q6-8h
 - 7-24 m: 2.5 ml PO q6-8h
 - 2-4 y: 3.75 ml PO q6-8h
 - 4-11 y: 5 ml PO q6-8h
 - ≥12 y: 5-10 ml PO q6-8h
- Diphenhydramine (Benadryl) 1 mg/kg/dose PO q6h prn [liquid: 12 mg/5 mL; tab, cap: 25, 50 mg]
- Brompheniramine (Dimetane)
 - 0.5 mg/kg/day PO q6h prn (for elixir or 4 mg tablet) or q8-12h prn (for SR tablets)
 - [elixir 2 mg/5 ml; tab: 4 mg; SR tab: 8, 12 mg]
- Chlorpheniramine maleate (Chlor-Trimeton): 0.35 mg/kg/day PO q4-6h
 - 2-6y: 1 mg PO q4-6h (max 4 mg/day)
 - 6-11y: 2 mg PO q4-6h (max 12 mg/day)
 - ≥12y: 4 mg PO q4-6h or 8-12 mg SR q8-12h (max 24 mg/day).
 - [soln: 2 mg/5 ml; tabs: 4, 8, 12 mg; SR tabs: 8, 12 mg]
- Hydroxyzine (Vistaril) 2-4 mg/kg/day PO q6h (max 50 mg/dose) [tabs 10, 25, 50,100 mg; susp 5 mg/ml; syrup 2 mg/ml].
- Terfenadine (Seldane), >12 yr: 60 mg PO bid [60 mg tabs].
 - Coadministration with erythromycin is contraindicated because of cardiac rhythm disturbances.
- Astemizole (Hismanal):
 - 6-12 yr: 5 mg/day PO qd
 - >12 yr: 10 mg PO qd
 - [10 mg tabs].
- Loratadine (Claritin) >12 yr 10 mg PO qd. [tab: 10 mg]

Decongestants:

- Pseudoephedrine (Sudafed, Novafed): children <12 yr: 4 mg/kg/day PO q6h. Children >12 yr and adults: 30-60 mg/dose PO q6-8h; sustained

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release 120 mg PO q12h. Max dose: 240 mg/24h. [Tabs: 30, 60 mg; sustained release caps: 120 mg; syrup: 15, 30 mg/5 ml; drops: 7.5 mg/0.8 ml]

Intranasal Steroids and Cromolyn:

- Beclomethasone: 1-2 sprays into each nostril bid-tid. Beconase AQ nasal, Vancenase nasal, Vancenase AQ nasal.
- Flunisolide (Nasalide) 1 spray into each nostril bid-tid.
- Cromolyn (Nasalcrom) 1 puff into each nostril q3-4h. Not recommended for acute treatment since duration of onset is 2-4 weeks.
- Triamcinolone (Nasacort)
 - >12 y: 2 sprays into each nostril qd.

Allergic Conjunctivitis Therapy:

- Cromolyn ophthalmic (Opticrom) instill 2 drops in each eye q4-6h.
- Naphazoline/pheniramine (Opcon A, Naphcon A) 1-2 drops in each eye q4-6h.

Anaphylaxis

1. Admit to:

2. Diagnosis: Anaphylaxis

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing: Inputs and outputs, elevate legs, ECG monitoring.

7. Diet:

8. IV Fluids: 2 IV lines. Normal saline or LR 10-20 ml/kg rapidly over 1h, then D5 1/2 NS at 1-1.5 times maintenance.

9. Special Medications:

-O2 at 6 L/min by NC or mask.

-Epinephrine, 0.01 mg/kg [0.01 ml/kg of 1 mg/ml = 1:1000] (maximum 0.5 ml) subcutaneously, repeat every 15-20 minutes prn. If anaphylaxis is the consequence of an insect sting or intramuscular injection, inject an additional 0.1 ml of epinephrine at the site to slow antigen absorption.

-Epinephrine racemic (if stridor is present), 2% nebulized 0.05 ml/kg/dose in 2.5 ml NS over 15 min q30min-4h (max 0.5 ml/dose).

-Albuterol (Ventolin) (0.5%, 5 mg/ml sln) nebulized 0.01-0.03 ml/kg (max 1 ml) in 2 ml NS q1-2h and prn; may be used in addition to epinephrine if necessary.

Corticosteroids:

-If symptoms are mild, give prednisone, initially 2 mg/kg/day (max 40 mg) PO q12h, then taper the dose off over 4-5 days. For more severe symptoms, give hydrocortisone 5 mg/kg IV q8h until stable, then change

to oral prednisone.

Antihistamines:

-Diphenhydramine (Benadryl) 1 mg/kg/dose IV/IM/IO/PO q6h, max 50 mg/dose; antihistamines are not a substitute for epinephrine.

-Hydroxyzine (Vistaril) 1 mg/kg/dose IM/IV/PO q4-6h, max 50 mg/dose

10. Extras and X-rays: Portable CXR, lateral soft tissue neck x-rays, ECG.

11. Labs: CBC, SMA 7, ABG.

Pleural Effusion

1. Admit to:

2. Diagnosis: Pleural effusion

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Diet:

7. IV Fluids:

8. Extras and X-rays: CXR PA and LAT, lateral decubitus, ultrasound, sputum AFB. Pulmonary consult.

9. Labs: CBC with differential, SMA 7, protein, albumin, ESR, UA.

Pleural fluid:

Tube 1 - LDH, protein, amylase, triglycerides, glucose, specific gravity (10 ml red top).

Tube 2 - Gram stain, culture and sensitivity, AFB, fungal culture and sensitivity, wet mount (20-60 ml).

Tube 3 - Cell count and differential (5-10 ml, EDTA purple top).

Tube 4 - Cytology, antigen tests for S pneumoniae, H influenza, (25-50 ml, heparinized).

Syringe - pH (2 ml, heparinized).

Evaluation of Thoracentesis Fluid

	Transudate	Exudate
Specific gravity	<1.016	>1.016
Protein ratio pleural fluid/serum	<0.5	>0.5
Protein (gm/100 ml)	<3.0	>3.0
LDH ratio pleural fluid/serum	<0.6	>0.6

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WBC	<1,000/mm ³	>1,000/mm ³
Glucose	Equivalent to Serum	Less than serum

Infectious Diseases

Suspected Sepsis

- 1. Admit to:**
- 2. Diagnosis:** Suspected sepsis
- 3. Condition:**
- 4. Vital signs:** Call MD if:
- 5. Activity:**
- 6. Nursing:** Inputs and outputs, daily weights, cooling measures prn temp >38°, consent for lumbar puncture. Strict isolation.
- 7. Diet:**
- 8. IV Fluids:** Correct hypovolemia if present; NS 10-20 ml/kg IV bolus, then IV fluids at 1-1.5 times maintenance.

9. Special Medications:

Term Newborn Infants <1 months old (GpB strep, E coli, or GpD strep, gram negatives, Listeria monocytogenes): Ampicillin and cefotaxime.

Ampicillin: (IV, IM)

<1200 gm 0-4 weeks: 100 mg/kg/day q12h
 1200-2000 gm: <7d: 100 mg/kg/day q12h; >7d: 150 mg/kg/day q8h
 >2000 gm: <7d: 150 mg/kg/day q8h; >7d: 200 mg/kg/day q6h

Cefotaxime (Claforan): (IV/IM)

<1200 grams, 0-4 wks: 100 mg/kg/day q12h
 >1200 grams, <7 days: 100 mg/kg/day q12h; >7 days: 150 mg/kg/day q8h

Also see page 98.

Infant 1-2 months old (H. flu, strep pneumonia, N meningitidis, GpB strep):

- Ampicillin 100 mg/kg/day IV/IM q6h **AND EITHER**
- Cefotaxime (Claforan) 100 mg/kg/day IV/IM q6h **OR**
- Gentamicin 7.5 mg/kg/day IV/IM q8h **OR**
- Ceftriaxone (Rocephin) 50-75 mg/kg/day IV/IM q 12-24h

Children 2 months to 18 years old (S pneumonia, H flu, N. meningitidis):

- Cefotaxime (Claforan) 100 mg/kg/day IV/IM q6h, max 12 g/d **OR**
- Cefuroxime (Zinacef) 100-150 mg/kg/day IV/IM q8h, max 9 g/d.

Neutropenic Patients (Gram negative bacilli, Pseudomonas, Staph, Strep viridans):

- Ticarcillin/clavulanate (Timenitin) 200-300 mg/kg/day of ticarcillin IV/IM q4-6h, max 18 g/d **OR**
- Ceftazidime (Fortaz) 100-150 mg/kg/day IV/IM q8h, max 12 gm/d **AND**
- Tobramycin or Gentamicin (normal renal function):

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<5 yr (except neonates): 7.5 mg/kg/day IV/IM q8h.

5-10 yr: 6.0 mg/kg/day IV/IM q8h.

>10 yr: 5.0 mg/kg/day IV/IM q8h **AND**

-Vancomycin (if patient has signs of central line infection) 40-60 mg/kg/day IV q6h, max 2 g/d.

10. Symptomatic Meds:

-Ibuprofen (Advil) 5-10 mg/kg/dose PO q6h-8h.

-Acetaminophen (Tylenol) 10-15 mg/kg PO/PR q4-6h prn temp >39° or pain.

11. Extras and X-rays: CXR.

12. Labs: CBC, SMA 7. Blood Culture and sensitivity. UA, urine Culture and sensitivity. ESR, antibiotic levels. Stool for wright stain if diarrhea.

Nasopharyngeal washings for direct fluorescent antibody (RSV,, chlamydia).

Urine antigen screen for H flu, group B strep, pneumococcus, meningococcus.

CSF Tube 1 - Gram stain, Culture and sensitivity for bacteria, antigen screen (1-2 ml).

CSF Tube 2 - Glucose, protein (1-2 ml).

CSF Tube 3 - Cell count and differential (1-2 ml).

Meningitis

1. Admit to:

2. Diagnosis: Meningitis.

3. Condition: Guarded.

4. Vital signs: Call MD if:

5. Activity:

6. Nursing: Strict isolation precautions. Inputs and outputs, daily weights; cooling measures prn temp >38°; consent for lumbar puncture. Monitor for signs of increased intracranial pressure.

7. Diet:

8. IV Fluids: Isotonic fluids at maintenance rate.

9. Special Medications:

Term Newborn Infants <1 months old (Group B strep, E coli, gram negatives, Listeria):

-Ampicillin, 0-7 d: 150 mg/kg/day IV/IM q8h; >7d: 200 mg/kg/day IV/IM q6h
AND

-Cefotaxime (Claforan): <7d: 100 mg/kg/day IV/IM q12h; >7 days: 150 mg/kg/day q8h IV/IM **OR**

-Gentamicin or Tobramycin 5 mg/kg/day IV/IM q12h

Infant 1-3 months old (H. flu, strep pneumonia, N. Meningitidis, GpB strep, E coli):

- Cefotaxime (Claforan) 200 mg/kg/day IV/IM q6h **OR**
- Ceftriaxone (Rocephin) 100 mg/kg/day IV/IM q 12-24h
- Dexamethasone 0.15 mg/kg/dose IV q6h x 4 days (16 doses; indicated to decrease inflammation and hearing loss; majority of studies support use in documented H flu infections). Initiate prior to antibiotics.

Children 3 months to 18 years old (S pneumonia, H flu, N. meningitidis):

- Cefotaxime (Claforan) 200 mg/kg/day IV/IM q6h, max 12 g/d or Ceftriaxone 100 mg/kg/day IV/IM q 12-24h, max 4 g/d **AND**
- Vancomycin 60 mg/kg/day IV q6h (due to increased incidence of strep pneumoniae resistance), max 2 g/d.
- Dexamethasone (see above).

10. Symptomatic Meds:

- Ibuprofen 5-10 mg/kg/dose PO q6-8h prn.
- Acetaminophen 15 mg/kg PO/PR q4h prn temp $>38^{\circ}$ or pain.

11. Extras and X-rays: CXR, MRI.

12. Labs: CBC, SMA 7. Blood culture and sensitivity. UA, urine culture and sensitivity; urine specific gravity. Antibiotic levels. Urine antigen screen for H flu, group B strep pneumococcus, meningococcus. Throat culture; urine and blood antigen tests.

Lumbar Puncture: (spinal needles, <1 yrs: 1½ inch, mid-childhood: 2½ inch; adolescents: 3½ inch).

CSF Tube 1 - Gram stain, culture and sensitivity, bacterial antigen screen (1-2 ml).

CSF Tube 2 - Glucose, protein (1-2 ml).

CSF Tube 3 - Cell count and differential (1-2 ml).

Specific Therapy of Meningitis and Encephalitis

Dexamethasone (0.6 mg/kg/day IV q6h x 4 days) with first dose given preferably before the first dose of antibiotics; decreases hearing deficits and possibly other neurologic sequelae in *Haemophilus influenzae* meningitis and perhaps other types of meningeal infections.

Streptococcus pneumoniae:

Sensitivities must be determined before treating with penicillin or cephalosporin monotherapy.

- Penicillin G 250,000 U/kg/day IV/IM q4h x 10d, max 24 MU/day **OR**
- Cefotaxime (Claforan) 200 mg/kg/day IV/IM q6h, max 12 gm/day **AND**
- Vancomycin 60 mg/kg/day IV q6h, max 2 g/d **OR**
- Rifampin 20 mg/kg/day IV, max 600 mg [inj: 600 mg]

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Neisseria meningitidis:

- Penicillin G 250,000 U/kg/day IV/IM q4h x 7-10d, max 24 MU/d.
- Consider Dexamethasone.

Meningococcal exposure prophylaxis (see H flu prophylaxis below):

- Ceftriaxone IM x 1 dose; <12y: 125 mg ≥12y: 250 mg **OR**
- Rifampin, <1 mth: 5 mg/kg/day PO q12h x 2 days; >1 mth: 10 mg/kg/dose (max 600 mg/dose) PO q12h x 4 doses [caps: 150 mg, 300 mg, (may open capsule and sprinkle contents on food; may compound oral suspension or smaller capsules)] **OR**
- Ciprofloxacin 500 mg PO x 1 for adults (>18 y).

Haemophilus influenzae

- Cefotaxime (Claforan) 200 mg/kg/day IV/IM q6h x 10d (max 12 g/d) **OR**
- Ceftriaxone (Rocephin) 100 mg/kg/day IV/IM q12h, max 4 g/d **OR**
- Ampicillin (beta-lactamase negative) 200 mg/kg/day IV/IM q6h x 10d, max 12 g/d.

H influenzae type B exposure prophylaxis and eradication of nasopharyngeal carriage: (non-pregnant household contacts who will be exposed to children <4 years old, and all close day care contacts <2 years old):

- Rifampin <1 month: 10 mg/kg/day PO q24h x 4 days; >1 month: 20 mg/kg PO qd x 4 doses (max 600 mg/dose). [caps: 150, 300 mg].

Group A or non-enterococcal Group D Streptococcus:

- Penicillin G 250,000 U/kg/day IV/IM q4-6h, max 24 MU/d.

Listeria monocytogenes or Group B strep:

- Ampicillin 200 mg/kg/day IV/IM q6h x 14d, max 12 g/d **AND**
- Gentamicin or Tobramycin (normal renal function):
 - <5 yr (except neonates): 7.5 mg/kg/day IV/IM q8h.
 - 5-10 yr: 6.0 mg/kg/day IV/IM q8h.
 - >10 yr: 5.0 mg/kg/day IV/IM q8h

Staphylococcus aureus:

- Nafcillin or Methicillin 150-200 mg/kg/day IV/IM q4-6h, max 12 g/d **OR**
- Vancomycin 40-60 mg/kg/day IV q6h, max 2 g/d (may require concomitant intrathecal therapy).

Herpes Simplex Encephalitis:

- Acyclovir (Zovirax) 25-50 mg/kg/day IV over 1h or longer q8h x 21 days **OR**
- Vidarabine 15 mg/kg IV infusion over 12-24 hr daily x 10d.

Infective Endocarditis

- 1. Admit to:**
- 2. Diagnosis:** Infective endocarditis
- 3. Condition:**
- 4. Vital signs:** Call MD if:
- 5. Activity:**
- 6. Diet:**
- 7. IV Fluids:**
- 8. Special Medications:**

Subacute Bacterial Endocarditis Empiric Therapy:

-Penicillin G 250,000 U/kg/day IV/IM q4-6, max 24 MU/d **AND**

-Gentamicin or Tobramycin (normal renal function):

<5 yr (except neonates): 7.5 mg/kg/day IV/IM q8h.

5-10 yr: 6.0 mg/kg/day IV/IM q8h.

>10 yr: 5.0 mg/kg/day IV/IM q8h

Note: may use lower doses of aminoglycoside if strictly using for synergy.

Acute Bacterial Endocarditis Empiric Therapy (including IV drug user):

-Gentamicin or Tobramycin, see above **AND EITHER**

-Nafcillin or Oxacillin 150 mg/kg/day IV/IM q6h, max 12 g/d **OR**

-Vancomycin 40-60 mg/kg/day IV q6h, max 2 g/d

Streptococci viridans/bovis:

-Penicillin G 150,000 u/kg/day IV/IM q4-6h, max 24 MU/d **OR**

-Vancomycin 40 mg/kg/day IV q6h, max 2 g/day.

Staphylococcus aureus (methicillin sensitive):

-Nafcillin or Oxacillin 150 mg/kg/day IV/IM q6h, max 12 g/day **AND**

-Gentamicin or Tobramycin, see above.

Methicillin resistant Staphylococcus aureus:

-Vancomycin 40-60 mg/kg/day IV q6h, max 2 g/d.

Staphylococcus epidermidis:

-Vancomycin 40-60 mg/kg/day IV q6h, max 2 g/d **AND**

-Gentamicin or Tobramycin, see above; may use lower doses if strictly using for synergy.

9. Extras and X-rays:

CXR PA and LAT, echocardiogram, ECG. Cardiology and infectious disease consultation.

10. Labs:

CBC, ESR. Bacterial culture and sensitivity x 3-4 over 24h (if septic, draw before starting antibiotic); MBC. Antibiotic levels. UA, urine culture and sensitivity.

Endocarditis Prophylaxis

Recommended Standard Prophylactic Regimen for Dental, Oral, or Upper Respiratory Tract Procedures in High Risk Patients:

-Amoxicillin: 50 mg/kg/dose (max 3.0 g) given orally 1 hour before the procedure, then 25 mg/kg (max 1.5 gm) given 6 hours after the initial dose.

For Amoxicillin/Penicillin Allergic Patients:

-Erythromycin: 20 mg/kg/dose (max 1 gm) given orally 2 hours before the procedure, then 10 mg/kg (max 500 mg) given 6 hours after the initial dose.

Pneumonia

1. Admit to:

2. Diagnosis: Pneumonia

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing: Respiratory isolation, pulse oximeter, inputs and outputs, postural percussion and drainage, nasotracheal suctioning prn. Bronchial clearance techniques, vibrating vest.

7. Diet:

8. IV Fluids:

9. Special Medications:

-Humidified O₂ by NC at 2-4 L/min or 25-100% by mask, adjust to keep saturation >92% (or >95% if chronic lung disease is present)

Term Neonates <1 month (gram-positive cocci, group B streptococcus and occasionally Staph. aureus, and gram-negative enteric bacilli):

-Ampicillin 100 mg/kg/day IV/IM q6h **AND**

-Cefotaxime (Claforan) <1 wk: 100 mg/kg/day IV/IM q12h; >1 wk: 150 mg/kg/day IV/IM q8h **OR**

-Gentamicin 5 mg/kg/day IV/IM q12h.

Children 1 month-5 years old (S. pneumoniae, H. influenzae type B, Chlamydia trachomatous (<18 weeks), Staph aureus):

-Cefuroxime (Zinacef) 100-150 mg/kg/day IV/IM q8h **OR**

-Cefotaxime (Claforan) 150 mg/kg/day IV/IM q8h **OR**

-Ampicillin 200 mg/kg/day IV/IM q6h **AND**

-Gentamicin or Tobramycin (normal renal function):

7.5 mg/kg/day IV/IM q8h **OR**

If chlamydia is strongly suspected, add erythromycin 20-40 mg/kg/day IV q6h.

Oral Therapy:

- Cefuroxime axetil (Ceftin) <2 y: 125 mg PO bid; 2-12 yrs: 250 mg PO bid; >12 yrs: 250-500 mg PO bid or 30 mg/kg/day PO q12h, max 500 mg/dose [susp: 125 mg/5 ml; tabs 250,500 mg]
- Loracarbef (Lorabid) 30 mg/kg/day PO q12h, max 200 mg/dose [susp: 100 mg/5 ml, cap: 200 mg]
- Cefpodoxime (Vantin) 10 mg/kg/day PO q12h, max 200 mg/day [susp: 50 mg/5 ml, 100 mg/5 ml; tabs: 100 mg, 200 mg]
- Cefprozil (Cefzil) 30 mg/kg/day PO q12h, max 500 mg/dose [susp 125 mg/5 ml, 250 mg/5 ml; tabs 250 mg, 500 mg].
- Cefixime (Suprax) 8 mg/kg/day PO qd-bid, max 400 mg/dose [tabs: 200, 400; susp: 100 mg/5 ml] Note: Suspension results in higher serum levels than tabs.
- Clarithromycin (Biaxin) 15 mg/kg/day PO q12h, max 500 mg/dose [susp: 125 mg/5 ml, 250 mg/5 ml; tab: 250, 500 mg].
- Amoxicillin/clavulanate (Augmentin) 30-40 mg/kg/day of amoxicillin PO q8h x 7-10d, max 500 mg/dose [chew tabs 125,250 mg; tabs: 250, 500 mg; elixir 125 mg/5 ml, 250 mg/5 ml]
- TMP/SMX (Bactrim, Septra), 6-12 mg TMP/kg/day PO q12h [single strength tab: 80 mg/400 mg; double strength tab: 160 mg/800 mg; susp per 5 ml: 40 mg/200 mg].

Community Acquired Pneumonia 5-18 years old (viral, M pneumoniae, chlamydia pneumoniae, pneumococcus, legionella):

-Erythromycin 30-50 mg/kg/day IV/IM or PO q6h

Erythromycin estolate

susp: 125 mg/5 ml, 250 mg/5 ml
chew tab: 125,250 mg
tab: 500 mg

Erythromycin ethylsuccinate

susp: 200 mg/5 ml, 400 mg/5 ml
chew tab: 200 mg
tab: 400 mg

Erythromycin base

tab: 250, 333, 500 mg

Erythromycin lactobionate

inj: 500 mg, 1 gm

-Clarithromycin (Biaxin) 15 mg/kg/day PO q12h, max 500 mg/dose [susp: 125 mg/5 ml, 250 mg/5 ml; tab: 250, 500 mg]. **OR**

-Cefuroxime (Zinacef) 100-150 mg/kg/day IV/IM q8h, max 9 g/d.

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Immunosuppressed, Neutropenic Pneumonia (S. pneumoniae, Gp A strep, H flu, gram neg enterics, Klebsiella, Mycoplasma Pneumonia, Legionella, Chlamydia pneumoniae, S aureus):

-Tobramycin (normal renal function):

<5 yr (except neonates): 7.5 mg/kg/day IV/IM q8h.

5-10 yr: 6.0 mg/kg/day IV/IM q8h.

>10 yr: 5.0 mg/kg/day IV/IM q8h **OR**

-Ceftazidime (Fortaz) 150 mg/kg/day IV/IM q8h, max 12 g/day **AND**

-Ticarcillin/clavulanate (Timentin) 200-300 mg/kg/day of ticarcillin IV q4-6h, max 18 g/day **OR**

-Nafcillin 150 mg/kg/day IV/IM q6h, max 12 gm/day **OR**

-Vancomycin 40 mg/kg/day IV q6h, max 2 gm/day.

Cystic Fibrosis Exacerbation (P aeruginosa):

-Ticarcillin/clavulanate (Timentin) 200-300 mg/kg/day of ticarcillin IV q4-6h, max 18 g/d **OR**

-Piperacillin 200-300 mg/kg/day IV/IM q6h, max 24 gm/day **AND**

-Tobramycin:

<5 yr (except neonates): 7.5 mg/kg/day IV/IM q8h.

5-10 yr: 6.0 mg/kg/day IV/IM q8h.

>10 yr: 5.0 mg/kg/day IV/IM q8h **OR**

-Ceftazidime (Fortaz) 150 mg/kg/day IV/IM q8h, max 12 g/day **OR**

-Aztreonam (Azactam) 150-200 mg/kg/day IV/IM q6-8h, max 8 g/day **OR**

-Imipenem/Cilastatin (Primaxin) 60-100 mg/kg/day imipenem component IV q6-8h, max 4 g/day.

Bronchodilators:

-Albuterol (Proventil, Ventolin) (0.5%, 5 mg/ml sln) nebulized 0.01-0.03 ml/kg (max 1 ml) in 2 ml NS q1-6h and prn.

10. Symptomatic Medications:

-Acetaminophen (Tylenol) 10-15 mg/kg PO/PR q3-4h prn temp >38° or pain.

11. Extras and X-rays: CXR PA, LAT, PPD.

12. Labs: CBC, ABG, blood culture and sensitivity. Sputum gram stain, culture and sensitivity, AFB. Antibiotic levels. Nasopharyngeal washings for direct fluorescent antibody (RSV, adenovirus, parainfluenza, influenza virus, chlamydia) and cultures for respiratory viruses. UA, culture and sensitivity.

Specific Therapy of Pneumonia

Pneumococcal pneumonia:

- Erythromycin 30-50 mg/kg/day PO or IV/IM q6h, max 4 gm/day IV, 2 gm/day PO **OR**
- Vancomycin 40 mg/kg/day IV q6h, max 2 gm/day **OR**
- Cefotaxime (Claforan) 100-150 mg/kg/day IV/IM q6h, max 12 g/day **OR**
- Penicillin G 150,000 U/kg/day IV/IM q4-6h (max 24 MU/day) or Pen VK 25-50 mg/kg/day PO q6h, max 2 gm/day if for mild infection.

Staphylococcus aureus:

- Oxacillin or Nafcillin 150-200 mg/kg/day IV/IM q4-6h, max 12 g/day **OR**
- Vancomycin 40 mg/kg/day IV q6h, max 2 g/day

Haemophilus influenzae (<5 yr of age):

- Cefotaxime (Claforan) 100-150 mg/kg/day IV/IM q8h, max 12 g/day **OR**
- Cefuroxime (Zinacef) 100-150 mg/kg/day IV/IM q8h (beta-lactamase pos), max 9 g/day **OR**
- Ampicillin 100-200 mg/kg/day IV/IM q6h (beta-lactamase negative); max 12 g/day

Pseudomonas aeruginosa:

- Tobramycin:
 - <5 yr (except neonates): 7.5 mg/kg/day IV/IM q8h.
 - 5-10 yr: 6.0 mg/kg/day IV/IM q8h.
 - >10 yr: 5.0 mg/kg/day IV/IM q8h **AND**
- Piperacillin or Ticarcillin 200-300 mg/kg/day IV/IM q4-6h, max 24 g/day **OR**
- Ceftazidime 150 mg/kg/day IV/IM q8h, max 12 g/day.

Mycoplasma pneumoniae:

- Clarithromycin (Biaxin) 15 mg/kg/day PO q12h, max 1 gm/day [susp: 125 mg/5 ml, 250 mg/5 ml; tab: 250, 500 mg].
- Erythromycin 30-50 mg/kg/day PO or IV q6h x 14-21 days, max 4 gm/day IV, 2 gm/day PO.
 - Erythromycin estolate
 - susp: 125 mg/5 ml, 250 mg/ml
 - chew tab: 125, 250 mg
 - tab: 500 mg
 - Erythromycin ethylsuccinate
 - susp: 200 mg/5 ml, 400 mg/5 ml
 - chew tab: 200 mg
 - tab: 400 mg
 - Erythromycin base
 - tab: 250, 333, 500 mg
- Tetracycline (**>8 yrs only**) 25-50 mg/kg/day PO q6h x 14-21 days, max 2 gm/day [caps: 100, 250, 500 mg; tabs: 250, 500 mg]

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Moraxella catarrhalis:

- Clarithromycin (Biaxin) 15 mg/kg/day PO q12h, max 1 gm/day [susp: 125 mg/5 ml, 250 mg/5 ml; tab: 250, 500 mg] **OR**
- Cefuroxime (Zinacef) 100-150 mg/kg/day IV/IM q8h, max 9 g/day **OR**
- Erythromycin 30-50 mg/kg/day IV/IM or PO q6h x 21 days **OR**
- Trimethoprim/SMX (Bactrim) 6-12 mg TMP/kg/day PO/IV q12h [per 5 ml: Trimethoprim 40 mg, sulfamethoxazole 200 mg; single strength tab: 80 mg/400 mg; double strength tab: 160 mg/800 mg].

Chlamydia pneumoniae (TWAR), psittaci, trachomatous:

- Erythromycin 30-50 mg/kg/day IV q6h, max 4 gm/day [inj: 500 mg, 1 gm] **OR**
- Azithromycin (Zithromax) >16 yrs 500 mg PO on day 1; 250 mg PO qd on days 2-5 [cap: 250 mg].

Influenza A:

- Amantadine (Symmetrel) 1-9 yr: 5-9 mg/kg/day PO qd-bid (max 200 mg/day); >9 yrs: 100-200 mg/day PO bid x 7d [syrup 50 mg/5 ml, cap: 100 mg].
- Rimantadine (Flumadine) <10 y: 5 mg/kg/day PO qd (max 150 mg); >10 y: 100 mg PO bid [syrup: 50 mg/5 ml; tab: 100 mg]

Bronchiolitis

1. Admit to:

2. Diagnosis: Bronchiolitis

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing: Pulse oximeter, peak flow rate. Respiratory isolation.

7. Diet:

8. IV Fluids:

9. Special Medications:

- Oxygen, humidified 1-4 L/min by NC or 40-60% by mask, keep sat >92%, or >95% if history of chronic lung disease.

Nebulized Beta 2 Agonists:

- Albuterol (Ventolin, Proventil) (0.5%, 5 mg/ml sln) nebulized 0.2-0.5 ml in 2 ml NS (0.10-0.15 mg/kg) q1-4h prn.

Respiratory Syncytial Virus (severe lung disease or underlying cardiopulmonary disease):

- Ribavirin (Virazole) 6 g vial (20 mg/ml) in water, aerosolized by SPAG nebulizer over 18-20h qd x 3-5 days or 2 gm over 2 hrs q8h x 3-5 days.

Influenza A:

- Amantadine (Symmetrel) 1-9 yr: 4.4-8.8 mg/kg/day PO qd-bid (max 150 mg/day); >9 yrs: 100-200 mg/day PO qd-bid x 7d [syrup 50 mg/5 ml, 100 mg cap] **OR**
- Rimantadine (Flumadine) <10 y: 5 mg/kg/day PO qd (max 150 mg); >10 y: 100 mg PO bid [syrup: 50 mg/5 ml; tab: 100 mg].

Pertussis:

- Erythromycin estolate 40-50 mg/kg/day PO q6h x 10 days, max 2 g/day [cap: 250 mg; tab: 500 mg; susp: 125 mg/5 ml, 250 mg/5 ml] or erythromycin lactobionate 40 mg/kg/day IV q6h, max 4 g/day.

Oral Beta 2 Agonists and Acetaminophen:

- Albuterol liquid (Proventil, Ventolin) 2-6 years: 0.1-0.2 mg/kg/dose PO q6-8h; 6-12 years: 2 mg PO tid-qid; >12 years: 2-4 mg PO tid-qid [soln: 2 mg/5 ml; tab: 2.4 mg; tab, SR: 4 mg]
- Acetaminophen (Tylenol) 10-15 mg/kg PO/PR q4-6h prn temp >39°.

10. Extras and X-rays: CXR, sweat test.**11. Labs:** CBC, SMA 7, CBG/ABG. Blood culture and sensitivity, UA. Urine antigen screen. Nasopharyngeal washings for direct fluorescent antibody (RSV, adenovirus, parainfluenza, influenza virus, chlamydia), viral and pertussis cultures.

Croup

1. Admit to:**2. Diagnosis:** Croup**3. Condition:****4. Vital signs:** Call MD if:**5. Activity:****6. Nursing:** Pulse oximeter, laryngoscope and endotracheal tube at bedside. Respiratory isolation. Quiet room, inputs and outputs.**7. Diet:****8. IV Fluids:****9. Special Medications and Treatment:**

- Oxygen, cool mist, 1-2 L/min by NC or 40-60% by mask, keep sat >92%.
- Racemic Epinephrine (2.25% sln) 0.05 ml/kg/dose (max 0.5 ml) in 2-3 ml sterile water nebulized q1-6h.
- Dexamethasone (Decadron) 0.25-0.5 mg/kg/dose IM/IV q6h prn; max dose 10 mg **OR**
- Prednisone 1-2 mg/kg/day PO q12-24h x 3-5 days [tabs: 1, 2, 5, 10, 20, 50 mg; oral solution: 1 mg/ml, 5 mg/ml] **OR**
- Prednisolone 2 mg/kg/day PO q12-24h x 3-5 days [5 mg/5 ml, Prelone 15 mg/5 ml].

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- 10. Extras and X-rays:** CXR PA and LAT, soft tissue x-ray of neck for characteristic “steeple sign.”
- 11. Labs:** CBC, CBG/ABG, blood culture and sensitivity; UA, culture and sensitivity. Urine antigen screen. Nasopharyngeal washings for direct fluorescent antibody (RSV, adenovirus, parainfluenza, influenza virus, chlamydia) and viral cultures.

Pneumocystis Carinii Pneumonia

- 1. Admit to:**
- 2. Diagnosis:**
- 3. Condition:**
- 4. Vital signs:** Call MD if:
- 5. Activity:**
- 6. Nursing:** Daily weights. Body fluid precautions.
- 7. Diet:**
- 8. IV Fluids:**
- 9. Special Medications:**

Pneumocystis Carinii Pneumonia:

- Oxygen prn for hypoxia
- Trimethoprim/Sulfamethoxazole (Bactrim, Septra) 20 mg TMP/kg/day IV/PO q6h x 14-21 days [susp per 5 ml: TMP 40 mg/SMX 200 mg; SS tab: TMP 80 mg/SMX 400 mg; DS tab: TMP 160 mg/SMX 800 mg; inj per ml: TMP 16 mg/SMX 80 mg] **OR**
- Pentamidine isethionate (Pentam) 4 mg/kg/day IV over 1-2h for 14-21d
- Prednisone
Patients >13 yrs old with hypoxia: Oral prednisone 80 mg/day in 2 divided doses is recommended days 1-5 of therapy, 40 mg/day on days 6-10, and 20 mg/day on days 11-21.

PCP Prophylaxis:

- Trimethoprim/SMX 5 mg trimethoprim/kg/day PO bid three days per week. [susp per 5 ml: TMP 40 mg/SMX 200 mg; SS tab: TMP 80 mg/SMX 400 mg; DS tab: TMP 160 mg/SMX 800 mg] **OR**
- Dapsone 1 mg/kg/day PO q24h [tabs: 25,100 mg] **OR**
- Pentamidine 4 mg/kg IV q2-4 weeks, max 300 mg/dose.

- 10. Extras and X-rays:** CXR PA and LAT, PPD.

- 11. Labs:** CBC, SMA 7, LDH. Blood culture and sensitivity x 2. Sputum Gram stain, culture and sensitivity. Silver stain for Pneumocystis, AFB. Serum CD4, HIV RNA. Urine culture and sensitivity, UA.

Opportunistic Infections in AIDS

Oropharyngeal Candidiasis:

- Clotrimazole troches 10 mg dissolve in mouth 5 times/24h **OR**
- Ketoconazole (Nizoral) 5-10 mg/kg/day PO q12-24h [tab: 200 mg] **OR**
- Nystatin susp. Premature infants 1 ml; infants 2 ml; children 5 ml. Swish and swallow qid **OR**
- Fluconazole (Diflucan) 10 mg/kg IV or PO loading dose, followed by 3-6 mg/kg PO or IV qd [inj: 2 mg/ml; tabs: 50, 100, 200 mg, susp: 10 mg/ml, 40 mg/ml].

Invasive or Disseminated Candidiasis:

- Amphotericin B, test dose of 0.1 mg/kg (max 1 mg), followed by remainder of 1st days dose if tolerated. Initial dose: 0.25 mg/kg/day; increase by 0.25 mg/kg/day q1-2 days. Usual dose 0.5-1 mg/kg; max dose 50 mg.
- Pretreatment (except test dose) - Acetaminophen, hydrocortisone, diphenhydramine; give Demerol during infusion if chilling occurs.
- Liposomal Amphotericin 5 mg/kg IV over 2 hrs qd.

Antiretroviral Therapy:

- Zidovudine (Retrovir, AZT) - oral
 - <2 weeks: 8 mg/kg/day PO q6h
 - 2-4 weeks: 12 mg/kg/day PO q6h
 - 4 weeks - 3 mos: 16 mg/kg/day PO q6h
 - 3 mth-12 y: 90-180 mg/m²/dose q6h (max 200 mg/dose)
 - >12 y Asymptomatic: 100 mg q4h while awake (max 500 mg/day).
 - Symptomatic: 200 mg q4h while awake (max 1200 mg/day) x 1 month, then 100 mg q4h.
 - [soln: 10 mg/ml; caps: 100 mg]

- Zidovudine - intravenous

- Infants: 6 mg/kg/day IV q6h
- 3 mth-12 y: 0.5-1.8 mg/kg/hr continuous IV infusion or 100 mg/m²/dose IV q6h
- >12 y: 1-2 mg/kg q4h
- [inj: 10 mg/ml]

- Lamivudine (Epivir, 3TC)

- 3-12 y: 8 mg/kg/day PO bid (max 150 mg/dose)
- >12 y: 150 mg PO bid
- [tab: 150 mg; soln: 10 mg/ml]

Comment: Used in combination with zidovudine.

- Didanosine (Videx, ddI)

- <1 year or ≤0.4 m²: 100-300 mg/m²/day PO q12h (1 tablet per dose).
- ≥1 year: 100-300 mg/m²/day PO q12h (2 tablets per dose).
- For children ≥35 kg
- 35-49 kg: 125 mg PO q12h (2 tablets per dose) **OR**

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167 mg PO q12h (buffered oral soln)

50-74 kg: 200 mg PO q12h (2 tablets per dose) **OR**

250 mg PO q12h (using buffered oral soln) **OR**

≥75 kg: 300 mg PO q12h (use two tablets per dose) **OR**

375 mg PO q12h (using buffered oral soln).

Tabs, buffered: 25, 50, 100, 150 mg

Buffered oral solution (single dose packet): 100, 167, 250, 375 mg

Pediatric oral solution: 10 mg/ml (when reconstituted). This drug is very acid labile, and it must be taken on an empty stomach.

Cryptococcus Neoformans Meningitis:

-Amphotericin B 1 mg/kg/day IV qd over 2-4h x 8-12 weeks (see test dose and titration, page 49) **OR**

-Fluconazole (Diflucan) 3-6 mg/kg/day IV/PO qd [inj: 2 mg/ml; tabs: 50, 100, 200 mg, susp: 10 mg/ml, 40 mg/ml].

Herpes Simplex Infections:

-Acyclovir (Zovirax) (HSV) 5 mg/kg/dose IV (10 mg/kg if visceral involvement) q8h for 7-10d (infuse each dose over 1 hr) or 20 mg/kg/dose PO q6h (max 800 mg/dose) [caps: 200 mg, tabs: 400, 800 mg; susp: 200 mg/5 ml].

Herpes Simplex Encephalitis:

-Acyclovir (Zovirax), 500 mg/m²/dose IV q8h.

Herpes Varicella Zoster:

-Acyclovir (Zovirax) 30 mg/kg/day IV over 60 min q8h for 10 days.

Cytomegalovirus Infections:

-Ganciclovir (Cytovene) children >3 mo-adults: 10 mg/kg/dose IV over 1-2h q12h x 14-21d, maintenance 5 mg/kg/day IV qd or 6 mg/kg/dose IV five days weekly (do not combine with zidovudine).

Active Pulmonary Tuberculosis:

-Isoniazid 10-20 mg/kg/day qd-bid (max 300 mg/day) x 9 months after culture negative [tabs 100 mg, 300 mg; syrup 10 mg/ml] **AND**

-Rifampin 10-20 mg/kg/day PO qd-bid (max 600 mg/day) x 9 months after culture negative [capsules: 150, 300 mg] **AND**

-Ethambutol <12 y: 10-15 mg/kg/day PO qd; >12 y: 15-25 mg/kg/day PO qd (max 2500 mg/d) PO x 2 months (if extrapulmonary disease, use pyrazinamide instead) [tabs 100,400 mg] **OR**

-Pyrazinamide 20-40 mg/kg/day qd-bid (max 2000 mg per day) PO x 2 months [tab: 500 mg].

Tuberculosis Prophylaxis:

-Isoniazid 10-20 mg/kg/day (max 300 mg/day) PO qd x 12 months [syrup 10 mg/ml; tab: 50, 100, 300 mg].

Toxoplasmosis:

-Pyrimethamine (Daraprim) 2 mg/kg/day (max 100 mg/d) PO q12h x 3 days, then 1 mg/kg/day (max 25 mg/day) PO qd indefinitely [tab: 25 mg] and

folinic acid 5-10 mg/d PO qd **AND**

-Sulfadiazine 100 mg/kg/day PO tid-qid x 3-4 weeks, with ample fluids (max 8 g/day) [500 mg tab or extemporaneous suspension]

Disseminated Histoplasmosis or Coccidiomycosis:

-Amphotericin B 1 mg/kg/day IV qd over 2-4h x 8-12 weeks (see test dose and titration, page 49).

Mycobacterium Avium Complex (MAC):

-Clarithromycin (Biaxin) 30 mg/kg/day PO q12h, max 1 g/day [tab: 250, 500 mg; susp: 125 mg/5 ml, 250 mg/5 ml] **OR**

-Azithromycin (Zithromax) 10-20 mg/kg/day PO qd, max 500 mg [cap: 250 mg; susp: 1 g packet] **AND**

-Ethambutol 15-25 mg/kg/day PO qd, max 1 gm [tab: 100, 400 mg] **OR**

-Rifabutin (>12 y) 450-600 mg/day PO qd-bid [cap: 150 mg] **OR**

-Rifampin 10-20 mg/kg/day PO q12-24h, max 600 mg/day [cap: 150, 300 mg; can make extemporaneous suspension].

Treatment regimen should include at least two drugs and should continue for the lifetime of the patient.

Septic Arthritis

1. Admit to:

2. Diagnosis: Septic arthritis

3. Condition:

4. Vital signs: Call MD if:

5. Activity: No weight bearing on infected joint.

6. Nursing: Warm compresses prn, keep joint immobilized. Consent for arthrocentesis.

7. Diet:

8. IV Fluids:

9. Special Medications:

Empiric Therapy for Infants 1-6 months (strep, staph, gram neg, gonococcus):

-Nafcillin or Oxacillin 100 mg/kg/day IV/IM q6h **AND**

-Cefotaxime (Claforan) 100 mg/kg/day IV/IM q6h **OR**

-Gentamicin or Tobramycin (normal renal function): 7.5 mg/kg/day IV/IM q8h.

Empiric Therapy for 6 month-4 yr (H flu, streptococci, staphylococcus):

-Cefuroxime (Zinacef) 100-150 mg/kg/day IV/IM q8h (preferred for H flu coverage until culture results available) **AND/OR**

-Nafcillin or Oxacillin 100-200 mg/kg/day IV/IM q6h.

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Empiric Therapy for Children >4 years (staph, strep):

- Nafcillin 150 mg/kg/day IV/IM q6h x ≥21d, max 12 g/d **OR**
- Vancomycin (MRSA) 40-60 mg/kg/day IV q6h, max 2 g/d.

10. Symptomatic Medications:

- Acetaminophen and codeine 0.5-1 mg codeine/kg/dose PO q4-6h prn pain
[codeine 12 mg/5 ml + Tylenol 120 mg/5 ml.]
- Ibuprofen (children's Advil) 5-10 mg/kg PO q6-8 hrs prn.

11. Extras and X-rays: X-ray views or ultrasound of joint, CXR. Orthopedics and infectious disease consults. CT scan, bone scan.

12. Labs: CBC, blood Culture and sensitivity x 2, VDRL, PPD, UA. Antibiotic levels. Urine antigen screen (H flu). Serial ESR.

Synovial fluid:

Tube 1 - Gram stain, culture and sensitivity, fungal culture.

Tube 2 - Glucose, protein, pH.

Tube 3 - Cell count.

Peritonitis

1. Admit to:

2. Diagnosis: Peritonitis

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing:

7. Diet:

8. IV Fluids:

9. Special Medications:

Primary Peritonitis:

-Penicillin 150,000 u/kg/day IV/IM q4-6h x 7-10d, max 24 MU/day.

Secondary Peritonitis (bowel perforation or appendicitis):

-Ampicillin 100 mg/kg/day IV/IM q6h, max 12 g/d **AND**

-Gentamicin or Tobramycin (normal renal function):

<5 yr (except neonates): 7.5 mg/kg/day IV/IM q8h.

5-10 yr: 6.0 mg/kg/day IV/IM q8h.

>10 yr: 5.0 mg/kg/day IV/IM q8h **AND**

-Metronidazole (Flagyl) 30 mg/kg/day IV q6h, max 4 g/d.

10. Extras and X-rays: CXR PA and LAT, abdominal ultrasound; KUB with lateral decubitus.

11. Labs: CBC, SMA 7, albumin, amylase, UA with micro, culture and sensitivity, liver panel, PT/PTT.

Paracentesis

Tube 1 - Cell count and differential (1-2 ml).

Tube 2 - Gram stain of sediment, culture and sensitivity, AFB (3-50 ml).

Tube 3 - Glucose, protein, albumin, LDH, triglyceride, bilirubin, amylase (2-5 ml red top tube).

Syringe - pH (3 ml).

Lower Urinary Tract Infection

1. Admit to:

2. Diagnosis: UTI

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing: Inputs and outputs, daily weights

7. Diet:

8. IV Fluids:

9. Special Medications:

Lower Urinary Tract Infection:

-TMP/SMX (Bactrim) 6-10 mg/kg/day PO q12h, max 320 T/day [per 5 ml: Trimethoprim 40 mg, sulfamethoxazole 200 mg; single strength tab: 80 mg/400 mg; double strength tab: 160 mg/800 mg] **OR**

-Amoxicillin 30-40 mg/kg/day PO q8h x 7-10 days; max 3 g/day [tabs: 500; chew tabs: 125, 250 mg, caps: 250, 500 mg, susp: 125 mg/5 ml, 250 mg/5 ml] **OR**

-Loracarbef (Lorabid) 30 mg/kg/day PO q12h; max 800 mg/day [susp: 100 mg/5 ml, caps: 200 mg] **OR**

-Cefpodoxime (Vantin) 10 mg/kg/day PO q12h, max 200 mg/day [susp: 50 mg/5 ml, 100 mg/5 ml; tabs: 100 mg, 200 mg] **OR**

-Cefprozil (Cefzil) 30 mg/kg/day PO q12h; max 1 g/day [susp: 125 mg/5 ml, 250 mg/5 ml; tabs: 250, 500 mg] **OR**

-Nitrofurantoin (Macrodantin) 5-7 mg/kg/day PO qid; max 400 mg/day [caps: 25, 50, 100 mg; susp: 25 mg/5 ml; tabs: 50,100 mg].

Prophylactic Therapy:

-Trimethoprim/SMX (Bactrim), 2 mg TMP/kg/day and 10 mg SMX/kg/day PO qhs [per 5 ml: Trimethoprim 40 mg, sulfamethoxazole 200 mg; single strength tab: 80 mg/400 mg; double strength tab: 160 mg/800 mg] **OR**

-Nitrofurantoin (Macrodantin) 1.2-2.4 mg/kg/day PO qhs [caps: 25, 50, 100 mg; susp: 25 mg/5 ml; tabs: 50,100 mg] **OR**

-Sulfisoxazole (Gantrisin) 50 mg/kg/day PO qhs [tab 500 mg; syrup 500 mg/5 ml].

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10. Symptomatic Medications:

-Phenazopyridine (Pyridium), children 6-12 yrs: 12 mg/kg/day PO tid (max 200 mg/dose); >12 yrs: 200 mg PO tid prn dysuria [tabs: 100, 200 mg].

11. Extras and X-rays: Renal ultrasound. Voiding cystourethrogram 3 weeks after infection. Radiological work up on all children <1 year of age.

12. Labs: CBC, SMA 7. UA with micro, urine Gram stain, culture and sensitivity. Repeat urine culture and sensitivity 24-48 hours after therapy; blood culture and sensitivity.

Pyelonephritis

1. Admit to:

2. Diagnosis: Pyelonephritis

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing: Inputs and outputs, daily weights

7. Diet:

8. IV Fluids:

9. Special Medications:

-If less than 1 week old, see suspected sepsis, page 37.

-Gentamicin or tobramycin (normal renal function):

30 days-5 yr: 7.5 mg/kg/day IV/IM q8h.

5-10 yr: 6.0 mg/kg/day IV/IM q8h.

>10 yr: 5.0 mg/kg/day IV/IM q8h **AND EITHER**

-Ampicillin 100 mg/kg/day IV/IM q6h, max 12 g/d **OR**

-Trimethoprim/sulfamethoxazole (Septra, Bactrim) 5-8 mg of TMP/kg/24h

IV/PO q12h (max dose 320 mg/24h); x 10d [susp: per 5 ml: Trimethoprim

40 mg, sulfamethoxazole 200 mg; single strength tab: 80 mg/400 mg;

double strength tab: 160 mg/800 mg; inj: TMP 16 mg/SMX 80 mg per ml]

OR

-Cefotaxime (Claforan) 100 mg/kg/day IV/IM q8h, max 12 g/d.

10. Symptomatic Medications:

-Phenazopyridine (Pyridium), children 6-12 yrs: 12 mg/kg/day PO tid prn dysuria (max 200 mg/dose); >12 yrs: 200 mg PO tid prn dysuria [tabs 100, 200 mg].

11. Extras and X-rays: Renal ultrasound. Voiding cystourethrogram at completion of therapy.

12. Labs: CBC, SMA-7. UA with micro, urine, culture and sensitivity. Repeat urine culture and sensitivity 24-48 hours after therapy; blood culture and sensitivity; drug levels.

Osteomyelitis

- 1. Admit to:**
 - 2. Diagnosis:** Osteomyelitis
 - 3. Condition:**
 - 4. Vital signs:** Call MD if:
 - 5. Activity:**
 - 6. Nursing:** Keep involved extremity elevated and immobilized. Consent for osteotomy.
 - 7. Diet:**
 - 8. IV Fluids:**
 - 9. Special Medications:**
- Children ≤3 yrs (H flu, strep, staph) :**
 -Cefuroxime (Zinacef) 100-150 mg/kg/day IV/IM q8h, max 9 gm/day
- Children >3 yrs (staph, strep, H flu):**
 -Nafcillin 100-150 mg/kg/day IV/IM q6h, max 12 g/day **OR**
 -Cefotaxime (Claforan) 100-150 mg/kg/day IV/IM q8h, max 12 g/day **OR**
 -Cefazolin (Ancef) 100 mg/kg/day IV/IM q6-8h, max 6 g/day **OR**
 -Cefuroxime (Zinacef) 100-150 mg/kg/day IV/IM q8h, max 9 gm/day.

Postoperative or Traumatic (staph, gram neg, Pseudomonas):

- Ticarcillin/Clavulanate (Timentin) 200-300 mg/kg/day of ticarcillin IV/IM q4-6h, max 18 g/d **OR**
- Vancomycin 40-60 mg/kg/day IV q6h, max 2 g/d **AND**
- Ceftazidime 150 mg/kg/day IV/IM q8h, max 12 gm/day **OR**
- Nafcillin 150 mg/kg/day IV/IM q6h, max 12 g/day **AND**
- Tobramycin
 30 days-5 yr: 7.5 mg/kg/day IV/IM q8h.
 5-10 yr: 6.0 mg/kg/day IV/IM q8h.
 >10 yr: 5.0 mg/kg/day IV q8h.

Chronic Osteomyelitis (staphylococcal):

- Dicloxacillin 75-100 mg/kg/day PO q6h, max 2 g/day [caps: 125,250,500 mg; susp: 62.5 mg/5 ml] **OR**
- Cephalexin (Keflex) 50-100 mg/kg/day PO q6-12h, max 4 g/day [caps 250, 500 mg; susp 125 mg/5 ml, 250 mg/5 ml]

10. Symptomatic Medications:

- Morphine 0.1 mg/kg IV q4-6h prn pain.
- Meperidine (Demerol) 1-1.5 mg/kg/dose IV/IM q3-4h prn pain.

11. Extras and X-rays:

Technetium and gallium bone scans, multiple X-ray views, CT/MRI. Orthopedic and infectious disease consultations.

12. Labs:

CBC, SMA 7, blood culture and sensitivity x 3, MIC, MBC, ESR, sickle prep, UA, culture and sensitivity, antibiotic levels, serum bacteriocidal

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Otitis Media

Acute Otitis Media (**S pneumoniae, non-typable H flu, M catarrhalis, Staph a, group A strep**):

-Treatment (10-14 days)

-Amoxicillin 30-40 mg/kg/day PO tid; max 3 g/day [tabs 125,250 mg; caps 250,500 mg; susp 125 mg/5 ml, 250 mg/5 ml] **OR**

-Trimethoprim/SMX (Bactrim, Septra) 6-8 mg/kg/day of TMP PO bid or 1 ml/kg/d PO divided bid; max 320 mg TMP/day [susp: per 5 ml: 40 mg/200 mg; SS tab: 80 mg/400 mg; DS tab: 160 mg/800 mg] **OR**

-Erythromycin/Sulfisoxazole (Pedialzole) 1 ml/kg/d or 40-50 mg/kg/day of erythromycin PO qid; max 50 ml/day [susp per 5 ml: erythromycin 200 mg/sulfisoxazole 600 mg]

OR

-Amoxicillin/clavulanate (Augmentin) 30-40 mg/kg/day of amoxicillin PO tid; max 2 g/day [tabs 250,500 may susp: 125 mg/5 ml, 250 mg/5 ml; chew tabs: 125, 250 mg] **OR**

-Clarithromycin (Biaxin) 15 mg/kg/day PO bid; max 1 g/day [tab: 250, 500 mg; susp: 125 mg/5 ml, 250 mg/5 ml] **OR**

-Cefixime (Suprax) 8 mg/kg/day PO bid-qd; max 400 mg/day [susp: 100 mg/5 ml; tab: 200, 400 mg] **OR**

-Cefuroxime axetil (Ceftin) <12 yrs: 125-250 mg PO bid; >12 yrs: 250-500 mg PO bid, max 1 g/day [tabs 125, 250, 500 mg; susp: 100 mg/5 mL] **OR**

-Loracarbef (Lorabid) 30 mg/kg/day PO bid; max 800 mg/day [susp: 100 mg/5 ml, caps: 200 mg] **OR**

-Cepipodoxime (Vantin) 10 mg/kg/day PO bid; max 800 mg/day [susp: 50 mg/5 ml, 100 mg/5 ml; tabs: 100 mg, 200 mg] **OR**

-Cefprozil (Cefzil) 30 mg/kg/day PO bid; max 1 g/day [susp: 125 mg/5 ml, 250 mg/5 ml; tabs: 250 mg, 500 mg] **OR**

-Ceftriaxone (Rocephin) one 50 mg/kg IM dose.

Prophylactic Therapy (**≥3 episodes in 6 months**):

-Sulfisoxazole (Gantrisin) 50 mg/kg/day PO qhs [tab 500 mg; susp 500 mg/5 ml] **OR**

-Amoxicillin 20 mg/kg/day PO qhs [caps: 250, 500 mg; susp: 125 mg/5 ml, 250 mg/5 ml] **OR**

-Trimethoprim/SMX 4 mg/kg/day of TMP PO qhs [susp: per 5 ml: 40 mg/200 mg; SS tab: 80 mg/400 mg; DS tab: 160 mg/800 mg].

Symptomatic Therapy:

- Ibuprofen (Advil) 5-10 mg/kg PO q6-8 hrs [suspension: 100 mg/5 ml, tabs: 200, 300, 400, 600, 800 mg] **AND/OR**
- Acetaminophen (Tylenol) 10-15 mg/kg PO/PR q4h [tabs: 325, 500 mg; chewable tabs: 80 mg; caplets: 160 mg, 500 mg; drops: 80 mg/0.8 ml; elixir: 120 mg/5 ml, 130 mg/5 ml, 160 mg/5 ml, 325 mg/5 ml; caplet, ER: 650 mg; suppositories: 120,325,650 mg].
- Benzocaine/antipyrine (Auralgan otic) fill canal and insert saturated pledge tid-qid prn pain x 2-3 days. Contraindicated in tympanic perforation.

Extras and X rays: Aspiration tympanocentesis, tympanogram; audiology evaluation and testing. Unresponsive cases may require ENT consult for tympanostomy and tube placement.

Otitis Externa

Otitis Externa (Pseudomonas, gram neg, proteus):

- Polymyxin B/neomycin/hydrocortisone (Cortisporin otic susp or solution) 2-4 drops in ear canal tid-qid x 5-7 days. If eardrum is perforated, use solution.

Malignant Otitis Externa in Diabetes (Pseudomonas):

- Ceftazidime (Fortaz) 100-150 mg/kg/day IV/IM q8h, max 12 g/d **OR**
- Piperacillin, ticarcillin, or azlocillin 200-300 mg/kg/day IV/IM q4-6h, max 24 g/day **OR**
- Tobramycin
 - 30 days-5 yr: 7.5 mg/kg/day IV/IM q8h.
 - 5-10 yr: 6.0 mg/kg/day IV/IM q8h.
 - >10 yr: 5.0 mg/kg/day IV q8h.

Pharyngeal Infections

Streptococcal Pharyngitis:

- Penicillin V 40 mg/kg/day PO qid x 10 days; max 2 g/day [tabs 125, 250, 500; susp 125 mg/5 ml, 250 mg/5 ml] **OR**
- Benzathine Penicillin (Bicillin) 25000 U/kg (max 1.2 mU) IM x 1 dose **OR**
- Erythromycin (penicillin allergic patients) 40 mg/kg/day PO qid x 10 days; max 2 g/day
 - Erythromycin estolate
 - susp: 125 mg/5 ml, 250 mg/ml
 - chew tab: 125, 250 mg
 - tab: 500 mg

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Erythromycin ethylsuccinate

susp: 200 mg/5 ml, 400 mg/5 ml

chew tab: 200 mg

tab: 400 mg

Erythromycin base

tab: 250, 333, 500 mg **OR**

-Clarithromycin (Biaxin) 15 mg/kg/day PO bid; max 1 g/day [tab 250, 500 mg tab; susp 125 mg/5 ml, 250 mg/5 ml.] **OR**

-Clindamycin 30-40 mg/kg/day PO q8h, max 1.8 gm/day [caps: 75, 150, 300 mg; susp: 75 mg/5 ml].

Refractory Pharyngitis:

-Amoxicillin/clavulanate (Augmentin) 40 mg/kg/day PO tid; max 2 g/day [tabs 250, 500; suspension 125 mg/5 ml, 250 mg/5 ml] **OR**

-Dicloxacillin 50-100 mg/kg/day PO qid; max 2 g/day [caps 125, 250, 500; elixir 62.5 mg/5 ml] **OR**

-Cephalexin (Keflex) 50 mg/kg/day PO qid-tid; max 4 g/day [caps 250, 500 mg; susp 125 mg/5 ml, 250 mg/5 ml].

Prophylaxis (5 strep infection in 6 months):

-Penicillin V 40 mg/kg/day PO bid [tabs 125, 250, 500 mg; susp 125 mg/5 ml, 250 mg/5 ml].

Retropharyngeal Abscess (strep, anaerobes, E corrodens):

-Clindamycin 30-40 mg/kg/day IV/IM q6-8h, max 4.8 g/day **OR**

-Nafcillin 100-150 mg/kg/day IV/IM q6h, max 12 g/day **AND**

-Cefuroxime (Zinacef) 75-100 mg/kg/day IV/IM q8h, max 9 g/day

Labs: Throat culture, rapid antigen test; lateral and PA neck films; CXR.

Otolaryngology consult for possible incision and drainage.

Epiglottitis

1. Admit to: Pediatric intensive care unit.

2. Diagnosis: Epiglottitis

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing: Pulse oximeter. Keep head of bed elevated, allow patient to sit; curved blade laryngoscope, tracheostomy tray and oropharyngeal tube at bedside. Avoid excessive manipulation or agitation. No examination of the pharynx. Do not draw blood or place IV lines. Respiratory isolation, pulse oximeter.

7. Diet: NPO

8. IV Fluids:

9. Special Medications:

- A definitive airway should be secured before manipulation of the patient.
- Oxygen, humidified, blow-by; keep sat >92%.
- Cool mist humidifier tent.

Antibiotics (H flu type b, S. pneumoniae):

- Cefuroxime (Zinacef) 100-150 mg/kg/day IV/IM q8h, max 9 g/day **OR**
- Cefotaxime (Claforan) 100-150 mg/kg/day IV/IM q6-8h, max 12 g/day

10. Extras and X-rays: CXR PA and LAT, lateral neck (Pancoast soft tissue). Otolaryngology consult.

11. Labs: CBC, CBG/ABG. Blood and throat culture and sensitivity, latex agglutination; UA, culture and sensitivity. Urine antigen screen.

Sinusitis

1. Treatment of Sinusitis (S. pneumoniae, H flu, M catarrhalis, gp A strep, anaerobes):

- Treat for 14-21 days.
- Amoxicillin 40 mg/kg/day PO tid; max 3 g/day [tabs 125, 250, 500 mg; susp 125 mg/5 ml, 250 mg/5 ml] **OR**
- Trimethoprim/SMX (Bactrim, Septra) 6-8 mg/kg/day of TMP PO bid, max 320 mg TMP/day [susp per 5 ml: 40 mg/200 mg; SS tab: 80 mg/400 mg; DS tab: 160 mg/800 mg] **OR**
- Amoxicillin/clavulanate (Augmentin) 40 mg/kg/day of amoxicillin PO tid; max 2 g/day [tabs 250, 500 mg; chew tabs: 125, 250 mg; susp 125 mg/5 ml, 250 mg/5 ml] **OR**
- Cefuroxime axetil (Ceftin) <2 y: 125 mg PO bid; 2-12 yrs: 250 mg PO bid; 30 mg/kg/day PO bid, >12 yrs: 250-500 mg PO bid, max 500 mg/dose [susp: 125 mg/5 ml; tabs 250, 500 mg] **OR**
- Clarithromycin (Biaxin) 15 mg/kg/day PO bid; max 1 g/day [susp 125 mg/5 ml, 250 mg/5 ml; tab 250, 500 mg]

2. Labs: Sinus x-rays. CBC.

Active Pulmonary Tuberculosis

1. Admit to:

2. Diagnosis: Active Pulmonary Tuberculosis

3. Condition:

4. Vital signs:

5. Activity:

6. Nursing: Respiratory isolation.

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7. Diet:

8. Special Medications:

Pulmonary Infection (including hilar adenopathy):

6 Month Regimen: Two months of isoniazid, rifampin, and pyrazinamide daily, followed by 4 months of isoniazid and rifampin daily **OR**
 Two months of isoniazid, rifampin, and pyrazinamide daily followed by 4 months of isoniazid and rifampin twice weekly.

9 Month Regimen (alternative): Nine months of isoniazid and rifampin daily
OR

one month of isoniazid and rifampin daily, followed by 8 months of isoniazid and rifampin twice weekly.

Anti-tuberculosis Agents:

Drug	Daily Dose	Twice Weekly Dose	Dosage Forms
Isoniazid	10-15 mg/kg/day qd, max 300 mg	20-30 mg/kg, max 900 mg	Tab: 50, 100, 300 mg; syr: 10 mg/ml
Rifampin	10-20 mg/kg/day qd, max 600 mg	10-20 mg/kg/dose, max 600 mg	Caps: 150, 300 mg, can make suspension
Pyrazinamide	20-40 mg/kg qd, max 2000 mg per day	50 mg/kg, max 2000 mg	EP susp, tab 500 mg
Ethambutol	15 mg/kg/day qd, max 2500 mg	50 mg/kg, max 2500 mg	Tab: 100, 400 mg
Streptomycin	20-40 mg/kg IM, max 1 gm/dose	20-40 mg/kg IM, max 1 gm	Inj: 400 mg/ml, IM only

Tuberculosis Prophylaxis for skin test conversion (Positive PPD, no disease):

- Isoniazid (susceptible), 10 mg/kg/day (max 300 mg) PO qd x 9 months.
- Isoniazid-resistant: Rifampin, 10 mg/kg/day PO qd (max 600 mg) for 9 months.
- Directly observed therapy should be considered for all patients. All household contacts should be tested.

9. Extras and X-rays: CXR PA, LAT, spinal series, ECG.

10. Labs: CBC, SMA7, liver panel, HIV antibody, ABG. First AM sputum for AFB x 3 (drug sensitivity tests on first isolate). Gastric aspirates for AFB qAM x 3. UA, urine AFB.

Cellulitis

- 1. Admit to:**
- 2. Diagnosis:** Cellulitis
- 3. Condition:**
- 4. Vital signs:** Call MD if:
- 5. Activity:**
- 6. Nursing:** Keep affected extremity elevated; warm compresses qid prn.
- 7. Diet:**
- 8. IV Fluids:**
- 9. Special Medications:**

Scalped Skin Syndrome, Impetigo, Staphylococcal Scarlet Fever:

- Oxacillin or Nafcillin 100-200 mg/kg/day IV/IM q4-6h; max 12 g/d **OR**
- Dicloxacillin (after response to IV Tx) 25-50 mg/kg/day PO qid x 5-7d; max 2 g/day [caps 125,250,500 mg; elixir 62.5 mg/5 ml] **OR**
- Cephalexin (Keflex) 25-50 mg/kg/day PO qid; max 4 g/day [caps: 250, 500 mg; susp: 125 mg/5 ml, 250 mg/5 ml] **OR**
- Loracarbef (Lorabid) 30 mg/kg/day PO bid; max 800 mg/day [susp: 100 mg/5 ml, caps: 200 mg pavules] **OR**
- Cefpodoxime (Vantin) 10 mg/kg/day PO bid; max 800 mg/day [susp: 50 mg/5 ml, 100 mg/5 ml; tabs: 100 mg, 200 mg] **OR**
- Cefprozil (Cefzil) 30 mg/kg/day PO bid; max 1 g/day [susp 125 mg/5 ml, 250 mg/5 ml; tabs 250 mg, 500 mg] **OR**
- Mupirocin (Bactroban) gel, apply topically tid. Extensive involvement requires systemic antibiotics.

Empiric Therapy for Extremity Cellulitis:

- Nafcillin or Oxacillin 100-200 mg/kg/day/IV/IM q4-6h, max 12 g/d **OR**
- Cefazolin (Ancef) 75-100 mg/kg/day IV/IM q6-8h, max 6 g/d **OR**
- Cefoxitin (Mefoxin) 100-150 mg/kg/day IV/IM q6h, max 12 g/d **OR**
- Ticarcillin/clavulanate (Timentin) 200-300 mg/kg/day IV/IM q4-6h, max 18 g/d **OR**
- Dicloxacillin 50-100 mg/kg/day PO qid; max 2 g/day [caps 125,250,500; elixir 62.5 mg/5 ml].

Cheek/Buccal Cellulitis (H flu):

- Cefuroxime (Zinacef) 100-150 mg/kg/day IV/IM q8h, max 9 g/d **OR**
- Cefotaxime (Claforan) 100-150 mg/kg/day IV/IM q6-8h, max 12 g/d

Periorbital Cellulitis (H. flu, pneumococcus; consider lumbar puncture, especially in unimmunized children):

- Cefuroxime (Zinacef) 100-150 mg/kg/day IV/IM q8h, max 9 g/d

10. Symptomatic Medications:

- Acetaminophen and codeine, 0.5-1 mg codeine/kg/dose PO q4-6h prn pain [codeine 12 mg/5 ml].

62 Tetanus

11. Extras and X-rays: X-ray views of site.

12. Labs: CBC, SMA 7, blood culture and sensitivity. Leading edge aspirate, drainage fluid for Gram stain, culture and sensitivity; UA, urine culture and sensitivity.

Tetanus

History of One or Two Primary Immunizations or Unknown:

Low risk wound - Tetanus toxoid 0.5 ml IM.

Tetanus prone - Tetanus toxoid 0.5 ml IM plus tetanus immunoglobulin (TIG) 250 U IM.

Three Primary Immunizations and 10 yrs or more since last Booster:

Low risk wound - Tetanus toxoid, 0.5 ml IM.

Tetanus prone - Tetanus toxoid, 0.5 ml IM.

Three Primary and 5-10 yrs since last Booster:

Low risk wound - None

Tetanus prone - Tetanus toxoid, 0.5 ml IM.

Three Primary and ≤5 yrs since last Booster:

Low risk wound - None

Tetanus prone - None

Treatment of Clostridium Tetani Infection:

-Tetanus immune globulin (TIG), single dose of 3,000 to 6,000 u IM.

-Part of the dose may be infiltrated locally around the wound. Keep wound clean and debrided.

-Penicillin G 100,000 u/kg/day IV q4-6h, max 24 MU/day x 10-14 days.

Pelvic Inflammatory Disease

- 1. Admit to:**
- 2. Diagnosis:** Pelvic Inflammatory Disease
- 3. Condition:**
- 4. Vital signs:** Call MD if:
- 5. Activity:**
- 6. Nursing:**
- 7. Diet:**
- 8. IV Fluids:**
- 9. Special Medications:**

Adolescent Outpatients

- Ceftriaxone (Rocephin) 250 mg IM once and doxycycline 100 mg PO bid for 14 days **OR**
- Cefoxitin (Mefoxin) 2 gm IM, with probenecid 1 gm PO and doxycycline (Vibramycin) 100 mg PO bid x 10-14d

Patients older than 18 years may be given ofloxacin 400 mg PO bid plus clindamycin 450 mg PO qid or metronidazole 500 mg PO bid.

Adolescent Inpatients

- Cefoxitin (Mefoxin) 2 gm IV q6h **OR**
- Cefotetan (Cefotan) 2 gm IV q12h **AND**
- Doxycycline (Vibramycin) 100 mg IV/PO q12h (IV for 4 days and 48h after afebrile, then complete 10-14 days of doxycycline 100 mg PO bid) [caps: 50,100 mg; tabs: 50,100 mg; susp: 5 mg/ml, 10 mg/ml] **OR**
- Clindamycin 900 mg IV q8h plus gentamicin 2 mg/kg IV loading dose followed by 1.5 mg/kg IV q8h. Continue for 48h after significant clinical improvement, followed by doxycycline 100 mg PO bid or clindamycin 450 mg PO q6h to complete 14 days of treatment.

Gonorrhea in Children less than 45 kg:

- Ceftriaxone (Rocephin) 125 mg IM x 1 dose (uncomplicated disease only)
OR 50-75 mg/kg/day IV/IM q24h (If ophthalmia, peritonitis, bacteremia, or arthritis, treat for 7 days) **OR**
- Spectinomycin 40 mg/kg IM (max 2 g) x 1 dose **OR**
- Amoxicillin 50 mg/kg PO once plus probenecid 25 mg/kg PO once (max 1 gm).

10. Symptomatic Medications:

- Acetaminophen (Tylenol) 10-15 mg/kg/dose PO/PR q4-6h prn.

11. Extras and X-rays:

Pelvic ultrasound; social services consult.

12. Labs:

CBC, SMA 7 and 12, ESR. GC and chlamydia culture, RPR or VDRL. UA with micro; serum beta HCG or urine pregnancy test.

64 Pediculosis

Pediculosis (Lice)

Treatment:

Disinfect clothing or bedding used in last 48 hours with hot water machine washing and drying, or dry clean.

For eyelash infestation, apply ophthalmic petrolatum ointment bid for 8-10 days. Use nit comb to remove nits.

0.3% Pyrethrin with Piperonyl Butoxide (A-200, Rid, R&C) - (shampoo, gel, soln): Apply to affected hairy and adjacent areas, avoiding face. After 10 min, wash hair with soap or shampoo; fine tooth comb remaining nits. May be repeated in 7-10 days prn.

1% Permethrin (Nix): Shampoo, rinse, and towel dry hair. Saturate hair and scalp with permethrin (especially behind ears and on nape of neck). Allow to remain on the hair for 10 minutes before rinsing; single treatment is sufficient. Comb out remaining nits.

1% Lindane (Kwell) - (cream, lotion, shampoo): Treatment of pediculosis: apply lotion or cream to the affected hairy and adjacent areas; avoid contact with eyes or mucous membranes. After 8-12 hours, wash with soap and water. 1% lindane shampoo may be used for head or pubic lice. Apply 15-30 ml of shampoo and lather for 4-5 minutes. Rinse hair with water, fine tooth comb remaining nits. Do not use shampoo for eyelash treatment. First treatment with lindane is usually successful. Treatment may be repeated after one week if live lice or nits remain. Contraindicated in children <2 years of age.

Scabies

Treatment:

Bathe with soap and water; scrub and remove scaling or crusted detritus; towel dry. All clothing and bed linen contaminated within past 2 days should be hot water washed and heat dried for 20 min or dry cleaned.

1% Lindane (Kwell, Gamma benzene) - available as cream, lotion:

Use 1% lindane for adults and older children; not recommended in pregnancy, infants, or excoriated skin. 1-2 treatments is usually effective. Massage a thin layer from neck to toes (including soles). In adults, 20-30 g of cream or lotion is sufficient for 1 application. Bathe after 8-12 hours. May be repeated in one week if mites remain or new lesions appear. Contraindicated in children <2 years of age.

5% Permethrin (Elimite) - cream: Adults and children: Massage cream into skin from head to soles of feet. Remove by washing after 8 to 14 hours. Treat infants on scalp, temple and forehead. One application is usually curative.

Dermatophyoses

Diagnostic procedures:

- (1) KOH prep of scales and skin scrapings for hyphae.
- (2) Cultures for uncertain cases.

Treatment

Tinea corporis, cruris, pedis:

Clotrimazole tid until resolved, then additional 1-2 weeks of therapy.

Tinea capitis:

Griseofulvin Microsize 10-20 mg/kg/day PO qd-bid (max 1,000 mg/day)
[tab: 250, 500 mg; cap: 125, 250 mg; susp: 125 mg/5 ml]

Griseofulvin Ultramicrosize 5.5-7.3 mg/kg/day PO qd-bid (max 750 mg/day)
[tab: 125, 165, 250, 330 mg]. Give with whole-milk or fatty foods (e.g. ice cream, peanuts) to increase absorption. May require 4-8 weeks of therapy.

Tinea of the Nails: Griseofulvin: (see dosage above) may require up to 4 mo of therapy.

Tinea Versicolor:

Selenium sulfide lotion or Tinactin cream. Apply to skin for 15 min, let dry, wash off. Use daily x 2-4 weeks. May need to use 1-2 times per week to prevent relapse.

66 Gastroenteritis and Diarrhea

Gastroenterology

Gastroenteritis and Diarrhea

1. Admit to:

2. Diagnosis: Acute Gastroenteritis

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing: Inputs and outputs, daily weights, urine specific gravity.

7. Diet: Rehydralyte, Pedialyte or soy formula (Isomil DF), or bland diet.

8. IV Fluids: See Dehydration page 89.

9. Special Medications:

Severe Gastroenteritis with Fever, gross blood and neutrophils in stool,

C. jejuni, E coli, Shigella, Salmonella:

-Trimethoprim/SMX (not effective against Campylobacter jejuni) 10 mg of TMP component kg/d PO bid x 5-7d [susp per 5 ml: 40 mg/200 mg; SS tab: 80 mg/400 mg; DS tab: 160 mg/800 mg].

Antibiotic Associated Diarrhea and Pseudomembranous Colitis (Clostridium difficile):

-Metronidazole (Flagyl) 20-30 mg/kg/day PO/IV q8h x 7 days (max 4 g/d). [tab: 250, 500 mg; can make extemporaneous oral suspension.]

-Vancomycin 10-40 mg/kg/day PO qid x 7 days, max 2 g/d [caps: 125, 250 mg; oral soln: 250 mg/5 ml, 500 mg/6 ml]

Salmonella (treat infants and patients with septicemia):

-Ampicillin 100-200 mg/kg/day IV q6h, max 12 g/d or 50-80 mg/kg/day PO qid x 5-7d, max 4 g/day [caps: 250, 500 mg; susp: 125 mg/5 ml, 250 mg/5 ml] OR

-Trimethoprim/SMX 10 mg TMP/kg/day PO bid x 5-7d, max 320 mg TMP/day [susp per 5 ml: 40 mg/200 mg; SS tab: 80 mg/400 mg; DS tab: 160 mg/800 mg] OR

-Ciprofloxacin (Cipro) (>18 yrs) 20-30 mg/kg/day PO bid (max 1.5 g/day) [tabs: 250, 500, 750 mg].

Rotavirus, for supportive treatment see Dehydration page 89.

10. Symptomatic Meds for acute, noninfectious gastroenteritis and diarrhea:

-Kaolin with pectin (Kaopectate), 3-6 yrs: 15-30 ml/dose; 6-12 yrs: 30-60 ml/dose; >12 y: 60-120 ml/dose after each loose BM or q3-4h prn OR

-Loperamide (Imodium)

2-6 y: 1 mg PO tid prn

6-8 y: 2 mg PO bid prn

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- 8-12 y: 2 mg PO tid prn
- >12 y: 4 mg PO x 1, then 2 mg PO with each loose stool (max 16 mg/day) [syr: 1 mg/5 ml, tab: 2 mg; cap: 2 mg] **OR**
- Diphenoxylate with atropine (Lomotil) >2 y: 0.3-0.4 mg diphenoxylate component/kg/day PO bid-qid prn (max 15 mg/day) [per 5 ml or tab: diphenoxylate 2.5 mg and atropine 0.025 mg] **OR**
- Bismuth subsalicylate (Pepto Bismol): (Note - if using extra strength liquid, only use ½ amount)
 - 3-6 yr: 5 ml or ⅓ tab PO tid-qid.
 - 6-9 yr: 10 ml or ⅔ tab PO tid-qid.
 - 9-12 yr: 15 ml or 1 tab PO tid-qid
 - >12 yr: 30 ml or 2 tabs PO tid-qid.
[chew tabs 262 mg; liquid 262 mg/15 ml; extra-strength liquid: 524 mg/15 ml]

11. Extras and X-rays: Upright abdomen

12. Labs: SMA7, CBC; stool Wright stain for leukocytes, rotazyme. Stool culture and sensitivity for enteric pathogens; C difficile toxin and culture, ova and parasites; occult blood. Urine specific gravity, UA, blood culture and sensitivity.

Specific Therapy of Gastroenteritis

Shigella Sonnei:

- Trimethoprim/SMX, 10 mg TMP/kg/day PO/IV q12h x 5 d [susp per 5 ml: 40 mg/200 mg; SS tab: 80 mg/400 mg; DS tab: 160 mg/800 mg].
- Ampicillin 50-80 mg/kg/day PO q6h, max 4 gm/day; or 100 mg/kg/day IV/IM q6h, max 12 g/day, x 5-7 days [caps: 250, 500 mg; susp: 125 mg/5 ml, 250 mg/5 ml]

Yersinia (sepsis):

- TMP/SMX 10 mg/kg/day TMP PO q12h x 5-7d [susp per 5 ml: 40 mg/200 mg; SS tab: 80 mg/400 mg; DS tab: 160 mg/800 mg]

Campylobacter jejuni:

- Erythromycin 40 mg/kg/day PO q6h x 5-7 days; max 2 g/day.
erythromycin estolate
susp: 125 mg/5 ml, 250 mg/ml
chew tab: 125, 250 mg
tab: 500 mg

- Erythromycin ethylsuccinate
susp: 200 mg/5 ml, 400 mg/5 ml
chew tab: 200 mg
tab: 400 mg

- Erythromycin base

tab: 250, 333, 500 mg **OR**

-Tetracycline (**>8 yrs only**) 20-30 mg/kg/day IV q8-12h or 25-50 mg/kg/day PO q6h x 14-21 days [caps: 100, 250, 500 mg; tabs: 250, 500 mg, susp: 125 mg/5 ml; inj: 250, 500 mg]

Helicobacter pylori infections:

-Bismuth subsalicylate (Pepto Bismol):

3-6 y: 1/3 tablet or 5 ml regular strength liquid PO qid

6-9 y: 2/3 tablet or 10 ml regular strength liquid PO qid

9-12 y: 1 tablet or 15 ml regular strength liquid PO qid

>12 y: 2 tablets or 30 ml regular strength liquid PO qid

or 15 ml extra strength liquid PO qid.

Tab, chew: 262 mg

Liquid: 262 mg/15 ml

Liquid, extra strength: 524 mg/15 ml

Plus: Amoxicillin 40 mg/kg/day PO q8h, max 3 g/day [tabs 250, 500 mg, susp 125 mg/5 ml, 250 mg/5 ml]

Plus: Metronidazole (Flagyl) 30 mg/kg/day PO q8h; max 500 mg/dose [tab: 250, 500 mg; can make extemporaneous oral suspension].

If >12 yr, may substitute tetracycline for amoxicillin using 25-50 mg/kg/day PO q6h (max 500 mg/dose). [caps: 100, 250, 500 mg; tab: 200, 500, mg; susp: 125 mg/5 ml]

Treat for 2 weeks.

Enteropathogenic E. coli (Travelers Diarrhea):

-Trimethoprim/SMX 10 mg/kg/day TMP PO/IV bid [susp per 5 ml: 40 mg/200 mg; SS tab: 80 mg/400 mg; DS tab: 160 mg/800 mg] **OR**

-Neomycin 100 mg/kg/day PO q6-8h [tab: 500 mg; oral soln: 125 mg/5 ml].

OR IF >8 y: Doxycycline (Vibramycin) 100 mg PO qd [caps: 50, 100 mg; tab: 50, 100 mg; susp: 5 mg/ml, 10 mg/ml].

Enteroinvasive E. coli:

-Trimethoprim/SMX 10 mg/kg/day TMP PO/IV q12h [susp per 5 ml: 40 mg/200 mg; SS tab: 80 mg/400 mg; DS tab: 160 mg/800 mg; inj per ml: 16 mg/80 mg]

Giardia Lamblia:

-Quinacrine hydrochloride 6 mg/kg/day PO q8h x 5d (max 300 mg/day) [tab: 100 mg] **OR**

-Metronidazole (Flagyl) 15 mg/kg/day PO q8h x 4 days (max 4 gm/day) [tab: 250, 500 mg; can make extemporaneous oral suspension] **OR**

-Furazolidone 5-10 mg/kg/day PO qid, max 100 mg/dose [tab: 100 mg; liquid: 50 mg/15 ml].

Entamoeba Histolytica:

Asymptomatic cyst carriers:

-Iodoquinol: 40 mg/kg/day PO q8h (max 2 gm/day) x 20 days [tab: 210 mg, 650 mg; powder for reconstitution] **OR** Paromomycin: 30

70 Ulcerative Colitis

mg/kg/day PO q8h x 7-10 days [cap 250 mg] **OR** Diloxanide: 20 mg/kg/day PO q8h x 10 days. [Presently available only through CDC.]

Mild to moderate intestinal symptoms with no dysentery:

- Metronidazole: 35-50 mg/kg/day PO q8h x 10 days, max 4 g/d [tab: 250, 500 mg; can make extemporaneous oral suspension] followed by iodoquinol 40 mg/kg/day q8h for 20 days **OR**
- Paromomycin: 30 mg/kg/day PO q8h x 7-10 days [cap 250 mg].

Dysentery or extraintestinal disease (including liver abscess):

- Metronidazole: 35-50 mg/kg/day PO q8h x 10 days [tab: 250, 500 mg; can make extemporaneous oral suspension.] Followed by:
- Iodoquinol: 40 mg/kg/day PO q8h x 20 days (max 2 gm/day) [tab: 210, 650 mg; powder for reconstitution] **OR**
- Dehydroemetine (only available through CDC) 1.0-1.5 mg/kg/day (max 90 mg) IMma q12h x 5 days, followed by chloroquine 10 mg base/kg/d (max 300 mg) PO x 14-21d **plus** iodoquinol or paromomycin, as above.

Severe Colitis:

- Metronidazole 35-70 mg/kg/day PO/IV q6h x 10 days **OR**
- Dehydroemetine (only available through CDC) 1.0-1.5 mg/kg/day (max 90 mg) IM bid x 5 days
- Either drug followed by: iodoquinol or paromomycin, as above.

Ulcerative Colitis

1. Admit to:

2. Diagnosis: Ulcerative colitis.

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing: Daily weights, inputs and outputs.

7. Diet: NPO except for ice chips, no milk products.

8. IV Fluids:

9. Special Medications:

- Sulfasalazine (Azulfidine), children >2 yrs:
 - Severe to moderate disease: 50-75 mg/kg/day PO q4-6h, max 6 gm/day.
 - Mild disease: 40-50 mg/kg/day PO q6h.
 - Maintenance therapy: 30-50 mg/kg/day PO q4-8h, max 2 gm/day.
[susp: 50 mg/ml; tab: 500 mg; tab, EC: 500 mg] **OR**
- Olsalazine sodium (Dipentum) >12 yrs: 500 mg PO with food bid [caps 250 mg].
- Hydrocortisone retention enema 100 mg PR qhs **OR**
- Hydrocortisone acetate 90 mg aerosol foam susp PR qd-bid or 25 mg supp

PR bid.

-Prednisone 1-2 mg/kg/day PO qAM or bid (max 40-60 mg/day).

Other Medications:

-Vitamin B12 100 mcg IM qd 5d then 100-200 mcg IM q month.

-Multivitamin PO qAM or 1 ampule IV qAM.

-Folic acid 1 mg PO qd.

10. Extras and X-rays: Upright abdomen, Surgical, GI, dietetics consults.

11. Labs: CBC, platelets, SMA 7, Mg, ionized calcium; liver panel, blood culture and sensitivity x 2. Stool culture and sensitivity for enteric pathogens, ova and parasites, C. difficile toxin, Wright's stain.

PARENTERAL NUTRITION

1. Admit to:

2. Diagnosis:

3. Condition:

4. Vital signs: Call MD if:

5. Nursing: Daily weights, inputs and outputs; measure head circumference and height. Finger stick glucose bid when stable.

6. Diet:

Total Parenteral Nutrition:

-Calculate daily protein solution fluid requirement less fluid from lipid and other sources. Calculate total amino acid requirement.

-Protein: Neonates and infants start with 0.5 gm/kg/d and increase to 0.5-1.0 gm/kg/d (max 10-12% of total calories/d). For children and young adults start with 1 gm/kg/d and increase by 1.0 gm/kg/d (max 2-3 gm/kg/d). Calculate percent amino acid to be infused: amino acid requirement divided by the volume of fluid from protein solution x 100.

-May advance daily dextrose concentration as tolerated while following blood glucose levels. Maximum concentration usually is 35% (D35W).

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TPN Requirements:

	<u>Infants-25 kg</u>	<u>25-45 kg</u>	<u>>45 kg</u>
Calories	90-120 Kcal/kg/day	60-105 Kcal/kg/day	40-75 Kcal/kg/day
Fluid	120-180 ml/kg/day	120-150 ml/kg/day	50-75 ml/kg/day
Dextrose	4-6 mg/kg/min	7-8 mg/kg/min	7-8 mg/kg/min
Protein	2-3 gm/kg/day	1.5-2.5 gm/kg/day	0.8-2.0 gm/kg/day
Sodium	2-6 mEq/kg/day	2-6 mEq/kg/day	60-150 mEq/day
Potassium	2-5 mEq/kg/day	2-5 mEq/kg/day	70-150 mEq/day
Chloride	2-3 mEq/kg/day	2-3 mEq/kg/day	2-3 mEq/kg/day
Calcium	1-2 mEq/kg/day	1 mEq/kg/day	0.2-0.3 mEq/kg/day
Phosphate	0.5-1 mMol/kg/day	0.5 mMol/kg/day	7-10 mm l/1000 cal
Magnesium	1-2 mEq/kg/day	1 mEq/kg/day	0.35-0.45 mEq/kg/day
Multi-Trace Element Formula	1 ml/day	1 ml/d	1 ml/day

Insulin and Acetate, if indicated.

Multivitamin (MVI or MVC 9+3):

<1 kg	1.5 ml/day Peds MVI
1-3 kg	3.3 ml/day Peds MVI
3 kg-11 yrs	5 ml/day Peds MVI
>11 yrs	MVC 9+3 10 ml/day

Dextrose Infusion:

Dextrose mg/kg/min = (% Dextrose x rate (ml/h) x 0.167) ÷ kg

Normal Starting Rate: 6-8 mg/kg/min

Lipid Solution:

- Minimum of 5% of total calories should be from fat emulsion. Max of 40% of calories as fat (10% sln = 1 gm/10 ml = 1.1 Kcal/ml; 20% sln = 2 gm/10 ml = 2.0 Kcal/ml).
- Neonates begin fat emulsion with 0.5 gm/kg/d and advance to 0.5-1 g/kg/d.
- For infants, children and young adults begin at 1 g/kg/d, advance as tolerated by 0.5-1 g/kg/d; max 3 g/kg/d or 40% of calories/day.
- Neonates - infuse over 20-24h; children and infants - infuse over 16-24h, max 0.15 gm/kg/h.
- Serum triglyceride 6h after infusion (maintain <200 mg/dL)

Peripheral Parenteral Supplementation:

- Calculate daily fluid requirement less fluid from lipid and other sources. Then calculate protein requirements: 1 gm/kg/day. Advance daily protein by 0.5-0.6 gm/kg/day until 3 gm/kg/day; monitor BUN/creatinine. Calculate percent protein to meet parenteral protein requirements:
- Protein requirement ÷ Fluid requirement x 100 = % amino acids.
- Begin with maximum tolerated dextrose concentration (Dextrose concentration >12.5% requires a central line).
- Calculate max fat emulsion intake (3 gm/kg/day), and calculate volume of 20% fat required (20 gm/100 ml = 20 %):
$$(\text{weight (kg}) \times \text{gm/kg/day}) \div 20 \times 100 = \text{ml of 20\% fat emulsion.}$$
Start with 0.5-1.0 gm/kg/day lipid and increase by 0.5-1.0 gm/kg/day until 3 gm/kg/day. Deliver over 18-24 hours.

-Draw blood 4-6h after end of infusion for triglyceride level.

8. Extras and X-rays: CXR, plain film for line placement, dietitian consult.

9. Labs:

Daily labs - Glucose, Na, K, Cl, HCO₃, BUN, OSM, CBC, cholesterol, triglyceride, urine glucose and specific gravity.

Twice weekly Labs - Calcium, phosphate, Mg, SMA-12

Weekly Labs - Protein, albumin, prealbumin, Mg, direct and indirect bilirubin, AST, GGT, alkaline phosphatase, iron, TIBC, transferrin, retinol-binding protein, PT/PTT, zinc, copper, B12, folate, 24h urine nitrogen and creatinine.

Peds Nutrition Panel I: Electrolytes, glucose calcium, phosphate.

Panel II: Panel I and Mg, BUN, creatinine, albumin, triglycerides, AST (SGPT).

Gastroesophageal Reflux

1. Treatment:

-Thicken feedings; give small volume feedings; keep child prone with head of bed elevated 30 degrees.

-Metoclopramide (Reglan) 0.1-0.2 mg/kg/dose PO qid 20-30 minutes prior to feedings, max 1 mg/kg/day [syrup: 1 mg/ml; tab 10 mg; concentrated soln: 10 mg/ml] **OR**

-Cisapride (Propulsid) 0.15-0.3 mg/kg/dose PO tid-qid [10 mg scored tab; susp: 1 mg/ml] **OR**

-Cimetidine (Tagamet) 20-40 mg/kg/day IV/PO q6h (20-30 min before feeding) [oral soln: 60 mg/ml; tabs 200, 300, 400, 800 mg, inj: 150 mg/ml] **OR**

-Ranitidine (Zantac) 2-3 mg/kg/day IV q8h or in TPN or 4-6 mg/kg/day PO q12h [tabs 150, 300 mg; liquid 15 mg/ml; inj 50 mg/ml.]

2. Extras and X-rays: Upper GI series; gastroesophageal nuclear scintigraphy (milk scan), endoscopy.

Constipation

Treatment:

1. Child < 2 years of Age:

Glycerine suppository

Dilation with a lubricated rectal thermometer or finger dilation is usually all that is needed in this age group.

2. Increase Bulk and Soften the Stool,

increase free water intake and use natural dietary lubricants (e.g., prune juice, olive oil, tomatoes, and tomato juice). In addition, high-residue foods (eg, fruits and green vegetables) and the addition of bran and whole grain products are optimal for lifelong dietary changes.

3. Child >2 years of Age:

- (1) Glycerine or bisacodyl (Dulcolax) suppository (one only)
- (2) Pediatric Fleet's enema (can be repeated once)
- (3) Mineral oil 15 ml PO.

4. Stool Softeners and Laxatives:

-Docusate sodium (Colace):

<3y	10-40 mg/day PO q6-24h
3-6y	20-60 mg/day PO q6-24h
6-12y	40-150 mg/day PO q6-24h
≥12y	50-400 mg/day PO q6-24h
[oral soln 10 mg/ml, 50 mg/ml; caps 50,100,250 mg]	

-Mineral oil:

5-11y	5-20 ml PO qd
>12y	15-45 ml PO qd

-Magnesium Hydroxide (Milk of Magnesia) 0.5 ml/kg/dose or 2-5 y: 5-15 ml; 6-12y: 15-30 ml; >12y: 30-60 ml PO prn.

-Phosphosoda enemas (Fleet's enema). May repeat once.

-Hyperosmotic Soln (CoLyte or GoLytely) 15-20 ml/kg/h PO/NG until bowel is clear.

5. Diagnostic Evaluation:

Anorectal manometry, potassium, calcium, thyroid panel.

Toxicology

Poisoning

Gastric Decontamination:

Activated Charcoal: 1 gm/kg/dose (max 50 gm) PO/NG, first dose should be given using product containing sorbitol as cathartic then switch to aqueous product. Repeat $\frac{1}{2}$ of initial dose q4h if indicated.

Gastric Lavage: Left side down, with head slightly lower than body; place large-bore orogastric tube and check position by injecting air and auscultating. Normal saline lavage: 15 ml/kg boluses until clear fluid (max 200-400 ml in adults), then give activated charcoal or other antidote prn. Save initial aspirate for toxicological exam. Gastric lavage is contraindicated if corrosives, hydrocarbons, or sharp objects were ingested.

Cathartics:

- Magnesium citrate 6% sln:
 - <6 yrs: 2-4 ml/kg/dose PO/NG
 - 6-12 yrs: 100-150 ml PO/NG
 - >12 yrs: 150-300 ml PO/NG

Antidotes to Common Poisonings

Cyanide Ingestion:

- Amyl Nitrite, inhale ampule contents for 30 seconds q1min until sodium nitrite is administered. Use new amp q3min **AND**
- Sodium Nitrite, 3% inj sln, 0.33 ml/kg (max 10 ml) IV over at least 5min. Repeat $\frac{1}{2}$ dose 30 min later if inadequate clinical response

Followed By:

- Sodium Thiosulfate, 1.65 ml/kg of 25% sln (max 50 ml) IV, repeat $\frac{1}{2}$ dose 30min later if inadequate clinical response.

Cyanide Antidote Kit:

Contains: Sodium nitrite 300 mg in 10 ml (2 amps)
 Sodium thiosulfate 12.5 gm in 50 ml (2 amps)
 Amyl nitrite inhalant 0.3 ml (12 aspirols)
 Also disposable syringes, stomach tube, and tourniquet.

Narcotic or Propoxyphene Overdose:

- Naloxone hydrochloride (Narcan) 0.1 mg/kg/dose, max 4 mg IV/IO/ET/IM/IO, may repeat q2min.

Methanol or Ethylene Glycol Overdose:

- Ethanol 7-10 ml/kg (10% inj sln) IV over 30min, then 0.8-1.4 ml/kg/hr.

76 Acetaminophen Overdose

Maintain ethanol level at 100-150 mg/dL.

Carbon Monoxide Inhalation:

-Oxygen 100% or hyperbaric oxygen if available.

Phenothiazine Reaction (Extrapyramidal Reaction):

-Diphenhydramine (Benadryl) 1 mg/kg IV/IM q6h x 4 doses; max 50 mg/dose; followed by 5 mg/kg/day PO q6h for 2-3 days.

Digoxin Overdose:

-Digibind (Digoxin immune Fab). Dose (# of 40 mg vials) = post-distribution digoxin level in ng/ml x body wt (kg)/100 **OR**
Dose (mg) = mg of digoxin ingested x 0.8 x 66.7

Benzodiazepine Overdose:

-Flumazenil (Romazicon) 0.01 mg/kg IV (0.1 mg/ml in 5 ml and 10 ml vials).
May need to repeat dose if patient becomes symptomatic again.

Alcohol Overdose: Cardiorespiratory support

Labs: Blood sugar; CBC, ABG, rapid toxicology screen.

Treatment: Dextrose 50% 1 gm/kg = 2 ml/kg (max 50 ml).

Naloxone 0.1 mg/kg (max 2 mg) IV, repeat q2min prn to max dose 8-10 mg if drug overdose suspected. For extreme agitation, give diazepam 0.1-0.3 mg/kg IV (max 10 mg).

Acetaminophen Overdose

1. Admit to:

2. Diagnosis: Acetaminophen overdose

3. Condition:

4. Vital signs: Call MD if

6. Nursing: ECG monitoring, inputs and outputs, pulse oximeter, aspiration and seizure precautions.

7. Diet:

8. IV Fluids:

9. Special Medications:

-Lavage with 2 L of normal saline by nasogastric tube.

-Activated Charcoal (if recent ingestion) 1 gm/kg PO or NG q2-4h, remove via suction prior to acetylcysteine.

-N-Acetylcysteine (Mucomyst, NAC)(if indicated) loading dose 140 mg/kg PO or NG, then 70 mg/kg PO or NG q4h x 17 doses (20% sln diluted 1:4 in carbonated beverage for oral administration); follow acetaminophen levels. Continue for full treatment course even if serum levels fall below nomogram.

-Phytonadione (Vitamin K) 5 mg PO/IV/IM/SQ (if PT >1.5 x control).

-Fresh frozen plasma (if PT >3 x control).

10. Extras and X-rays: Portable CXR. Nephrology consult for possible

charcoal hemoperfusion.

- 11. Labs:** CBC, SMA 7, liver panel, amylase, PT/PTT; SGOT, SGPT, bilirubin acetaminophen level now and q4h until nondetectable. Plot serum acetaminophen level on Rumack-Matthew nomogram to assess severity of ingestion. Do not delay therapy while waiting for serum level results. The nomogram should not be used if sustained release Tylenol was ingested.

Theophylline Overdose

- 1. Admit to:**
- 2. Diagnosis:** Theophylline overdose
- 3. Condition:**
- 4. Vital signs:** Call MD if:
- 5. Activity:**
- 6. Nursing:** ECG monitoring until level is less than 20 mcg/ml; inputs and outputs, aspiration and seizure precautions.
- 7. Diet:**
- 8. IV Fluids:** Give IV fluids at rate to treat dehydration.
- 9. Special Medications:**
 - Activated Charcoal liquid 1 gm/kg PO or NG q2-4h, followed by cathartic, regardless of time of ingestion.
 - Gastric Lavage if greater than 20 mg/kg ingested or if unknown amount ingested or if symptomatic.
 - Charcoal hemoperfusion (if serum level >60 mcg/ml or signs of neurotoxicity, seizure, coma). Ipecac is contraindicated because it may delay use of activated charcoal.
- 10. Extras and X-rays:** Portable CXR, ECG.
- 11. Labs:** CBC, SMA 7, theophylline level; PT/PTT, liver panel. Monitor K, Mg, phosphorus, calcium, acid/base balance, urine drug screen.

Iron Overdose

General Considerations and Treatment:

Induce emesis with ipecac if recent ingestion (<1 hour ago). Charcoal is not effective and should not be used.

-Gastric Lavage if greater than 20 mg/kg of elemental iron ingested or if unknown amount ingested or if symptomatic.

Labs: Type and cross, CBC, electrolytes, serum iron, TIBC, PT/PTT, blood sugar, liver function tests, calcium. KUB to determine if tablets are present in intestines (not all tablets are radiopaque).

Toxicity:

-Toxicity likely: >60 mg/kg elemental iron.

-Possibly toxic: 20-60 mg/kg elemental iron.

Management:

1. If hypotensive, give IV fluids, and place in Trendelenburg's position. If unresponsive to these measures, administer dopamine or norepinephrine by continuous IV infusion.
2. Maintain urine output of >2 ml/kg/h.
3. Monitor electrolytes carefully. Blood products may be needed.
4. If peak serum iron >350 mcg/dL or if patient is symptomatic, begin chelation therapy.
5. Deferoxamine (Desferal) 15 mg/kg/hr continuous IV infusion. Continue until serum iron is within normal range.
6. Consider exchange transfusion in severely symptomatic patients with serum iron >1,000 mcg/dL.

Neurology and Endocrinology

Seizure and Status Epilepticus

1. Admit to: Pediatric intensive care unit.

2. Diagnosis: Seizure

3. Condition:

4. Vital signs: neurochecks; call MD if:

5. Activity:

6. Nursing: Seizure and aspiration precautions, ECG and EEG monitoring.

7. Diet:

8. IV Fluids:

9. Special Medications:

Febrile Seizures: Control fever with antipyretics and cooling measures.

Usually requires no anticonvulsive therapy. Single febrile seizure poses no risk of epilepsy.

Status Epilepticus:

1. Maintain airway, 100% O₂ by mask; obtain brief history, fingerstick glucose, suction prn.
2. Start IV NS. If hypoglycemic, give 1-2 ml/kg D25W IV/IO (0.25-0.5 g/kg).
3. **Lorazepam (Ativan)** 0.1 mg/kg (max 4 mg per dose) IV/IM **OR**
Diazepam (Valium) 0.2-0.5 mg/kg slow IV/IO (max 10 mg). Repeat q15-20min x 3 prn; may be given rectally with a small needless syringe 4-5 cm within rectum (use injectable product).
4. Phenytoin (Dilantin) 15-18 mg/kg in normal saline at <1 mg/kg/min, max 50 mg/min IV/IO. Monitor BP and ECG (QT interval).
5. If seizures continue, **intubate** and give **Phenobarbital** loading dose of 15-20 mg/kg IV or 5 mg/kg IV every 15 minutes until seizures are controlled or 30 mg/kg is reached.
6. If seizures are refractory to above measures, consider midazolam infusion (0.1 mg/kg/hr) or general anesthesia with EEG monitoring.

Generalized Seizures Maintenance Therapy:

-Carbamazepine (Tegretol):

<6 y: initially 5 mg/kg/day PO bid, then may increase in 5-7 day intervals; usual maintenance dose 10-12 mg/kg/day PO bid-qid.

6-12 y: initially 100 mg PO bid or 10 mg/kg/day PO bid, then may increase by 100 mg/day at weekly intervals; usual maintenance dose 15-30 mg/kg/day PO bid-qid.

>12 y: initially 200 mg PO bid, then may increase by 200 mg/day at weekly intervals; usually maintenance dose 800-1200 mg/day PO bid-qid
[tab: 200 mg; tab, chewable: 100 mg; susp: 100 mg/5 ml] **OR**

80 Seizure and Status Epilepticus

-Divalproex sodium (Depakote, Valproic acid):

Initially 10-15 mg/kg/day PO bid-tid, then increase by 5-10 mg/kg/day weekly as needed; usual maintenance dose 30-60 mg/kg/day PO bid-tid (children on multiple anticonvulsants may require higher doses [cap: 250 mg; cap, sprinkle: 125 mg; syrup: 250 mg/5 ml; tab, EC: 125,250,500 mg])

OR

-Phenobarbital: Loading dose 10-20 mg/kg IV/IM/PO, then maintenance dose 3-5 mg/kg/day PO/IV q12-24h [elixir: 4 mg/ml; tab: 8,16,32,65,100 mg] **OR**

-Phenytoin (Dilantin): Loading dose 15-18 mg/kg IV/PO, then maintenance dose 5-7 mg/kg/day PO/IV q8-24h (only sustained release capsules may be dosed q24h) [cap: 30, 100 mg; elixir: 125 mg/5 ml; tab, chewable: 50 mg]

Partial Seizures and Secondary Generalized Seizures:

-Carbamazepine (Tegretol), see above **OR**

-Phenytoin, see above

-Phenobarbital, see above **OR**

-Valproic acid, see above.

10. Extras and X-rays: MRI with and without gadolinium, EEG with hyperventilation, CXR, ECG. Neurology consultation.

11. Labs: ABG/CBG, CBC, SMA 7, calcium, phosphate, magnesium, liver panel, VDRL, anticonvulsant levels, blood and urine culture. UA, drug and toxin screen.

Therapeutic Serum Levels

carbamazepine	4-12 mcg/ml
clonazepam	20-80 mg/ml
ethosuximide	40-100 mcg/ml
phenobarbital	15-40 mcg/ml
phenytoin	10-20 mcg/ml
primidone	5-12 mcg/ml
valproic acid	50-100 mcg/ml

New Onset Diabetes

- 1. Admit to:**
- 2. Diagnosis:** New onset Diabetes Mellitus
- 3. Condition:**
- 4. Vital signs:** Call MD if:
- 5. Activity:**
- 6. Nursing:** Record labs on flow sheet. Fingerstick glucose at 0700, 1200, 1700, 2100, 0200; diabetic and dietetic teaching.
- 7. Diet:** American Diabetes Association Diet with 1,000-2,400 calories/day.
3 meals and 3 snacks (between each meal and qhs.)
- 8. IV Fluids:** Hep-lock with flush q shift.
- 9. Special Medications:**
 - Goal is fasting glucose of 70-140 mg/dL and postprandial glucose <180 mg/dL
 - Initial insulin (Humulin) dose for child with severe hyperglycemia and ketonuria but without acidosis or dehydration: 0.1-0.25 U regular/kg SC q6-8h. Supplement with regular insulin 0.1 U/kg before each meal if indicated.
 - On subsequent days give 2/3 of previous days total insulin requirement as NPH. Divide 2/3 before breakfast and 1/3 before dinner.
 - Usual daily maintenance dose for child: 0.5-1.0 U/kg/24h. In adolescents during growth spurt: 0.8-1.2 U/kg/24h.
- 10. Extras and X-rays:** CXR. Endocrine and dietary consult.
- 11. Labs:** CBC, ketones; SMA 7 and 12, antithyroglobulin, antithyroid microsomal, anti-insulin, anti-islet cell antibodies. UA, urine culture and sensitivity; urine pregnancy test; urine ketones.

Diabetic Ketoacidosis

1. **Admit to:** Pediatric intensive care unit.
2. **Diagnosis:** Diabetic ketoacidosis
3. **Condition:** Critical
4. **Vital signs:** Call MD if:
5. **Activity:**
6. **Nursing:** ECG monitoring; capillary glucose checks q1-2h until glucose level is <200 mg/dL, daily weights, inputs and outputs. O₂ at 2-4 L/min by NC or mask. Record labs on flow sheet. Urine specific gravity.
7. **Diet:** NPO
8. **IV Fluids:** 0.9% saline 10-20 ml/kg over 1h, then repeat until hemodynamically stable. Then give 0.45% saline, and replace ½ calculated deficit plus insensible loss over 8h, replace remaining ½ of deficit plus insensible losses over 16-24h. Keep urine output >1.0 ml/kg/hour.
Add KCL when no ECG signs of hyperkalemia (peaked T waves) and serum K+ ≤ 5.8 mEq/L.

Serum K+	Infusate KCL
<3	40-60 mEq/L
3-4	30
4-5	20
5-6	10
>6	0

Rate: 0.25-1 mEq KCL/kg/hr, maximum 1 mEq/kg/h or 20 mEq/h
(whichever is smaller)

9. Special Medications:

- Insulin Regular (Humulin) 0.05-0.1 U/kg/h (50 U in 500 ml NS) continuous IV infusion. Adjust to decrease glucose by 80-100 mg/dL/h.
- If glucose decreases at less than 50 mg/dL/h, increase insulin to 0.14-0.2 U/kg/hr. If glucose decreases faster than 100 mg/dL/h, continue insulin at 0.1 U/kg/h and add D5W to IV fluids. When glucose approaches 250-300 mg/dL, add D5W to IV. Change to subcutaneous insulin when ketones resolved, bicarbonate >15, and patient is tolerating PO food; do not discontinue insulin drip until 2h after subcutaneous dose of insulin.

Insulin Drip Rates

Blood Glucose Range mg/dL	Insulin Infusion Rate U/kg/hr
>275	0.1
250-275	0.08
225-250	0.06
200-225	0.05
175-200	0.04
<175	0.03

10. Extras and X-rays: Portable CXR, ECG. Endocrine and dietary consultation.

11. Labs: Dextrostixs q1-2h until glucose <200, then q3-6h. Glucose, potassium, phosphate, bicarbonate q3-4h; serum acetone, CBC. UA, urine ketones, culture and sensitivity.

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Hematology and Inflammatory Disorders

Sickle Cell Crisis

1. Admit to:
2. Diagnosis:
3. Condition:
4. Vital signs: Call MD if
5. Activity:
6. Nursing:
7. Diet:
8. IV Fluids: D5 1/2 NS at 1.5-2.0 x maintenance or 2000 ml/m²/24h.
9. Special Medications:

Oxygen

-Oxygen 2-4 L/min by NC or 30-100% by mask.

Pain Management

- Morphine sulfate 0.1-0.2 mg/kg/dose (max 10-15 mg) IV/IM/SC q2-4h prn or follow bolus by infusion of 0.05-0.1 mg/kg/h prn or 0.3-0.5 mg/kg PO q4h prn **OR**
- Acetaminophen/codeine 0.5-1 mg/kg/dose (max 60 mg/dose) of codeine IM/SC/PO q4-6h prn [elixir: 12 mg codeine/5 ml] **OR**
- Acetaminophen and hydrocodone [elixir per 5 ml: hydrocodone 2.5 mg, acetaminophen 167 mg; tabs:
Hydrocodone 2.5 mg acetaminophen 500 mg;
Hydrocodone 5 mg acetaminophen 500 mg;
Hydrocodone 7.5 mg acetaminophen 500 mg]
Children: 0.6 mg hydrocodone/kg/day PO q6-8h prn
<2 y: do not exceed 1.25 mg/dose
2-12 y: do not exceed 5 mg/dose
>12 y: do not exceed 10 mg/dose

-Patient controlled analgesia may be used if child is old enough to understand the concept.

- Morphine
 - basal rate 0.01-0.02 mg/kg/hr
 - intermittent bolus dose 0.01-0.03 mg/kg
 - bolus frequency ("lockout interval") every 6-15 minutes
- Hydromorphone (Dilaudid)
 - basal rate 0.0015-0.003 mg/kg/hr
 - intermittent bolus dose 0.0015-0.0045 mg/kg

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bolus frequency ("lockout interval") every 6-15 mins

Note: Meperidine (Demerol) is not recommended due to the risk of seizures caused by accumulation of normeperidine metabolite.

Maintenance Therapy

-Folic acid 1 mg PO qd (if >1 yr).

-Transfusion (if indicated) PRBC 5 ml/kg over 2h, then 10 ml/kg over 2h, then check hemoglobin. If hemoglobin <6-8 gm/dL, give additional 10 ml/kg.

-Penicillin V (prophylaxis), <3 yrs: 125 mg PO bid; >3 yrs: 250 mg PO bid [tabs 125,250,500 mg; elixir 125,250 mg/5 mL].

Amoxicillin may be used. Erythromycin is used in penicillin allergy.

Benzathine penicillin IM is given every 3 weeks if poor compliance with oral antibiotics.

10. Extras and X-rays: CXR.

11. Labs: CBC, blood culture and sensitivity, reticulocyte count, type and cross, parvovirus titers, SMA 7, UA, urine culture and sensitivity, mycoplasma titers.

Kawasaki's Syndrome

(Mucocutaneous Lymph Node Syndrome)

1. Admit to:

2. Diagnosis:

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing:

7. Diet:

8. Special Medications:

-Immunoglobulin (IVIG) 2 gm/kg/dose IV x 1 dose only. Administer dose at 0.02 ml/kg/min over 30 min; if no adverse reaction, increase to 0.04 ml/kg/min over 30 min; if no adverse reaction, increase to 0.08 ml/kg/min for remainder of infusion. Defer measles vaccination for 11 months after receiving high dose IVIG. [inj: 100 mg/ml]

-Aspirin 100 mg/kg/day PO or PR q6h until fever resolves, then 8-10 mg/kg/day PO/PR qd. [chew tab: 81 mg; tab: 325,500,650 mg; supp: 60,120,125,130,195,200,300,325,600,650 mg].

-Ambubag, epinephrine (0.1 ml/kg of 1:10,000), and diphenhydramine 1 mg/kg (max 50 mg) should be available for IV use if anaphylactic reaction to immunoglobulin occurs.

9. Extras and X-rays: ECG, echocardiogram, chest X-ray. Infectious

disease consult.

- 10. Labs:** CBC with differential and platelet count. ESR, CBC, liver function tests, rheumatoid factor, salicylate levels (while on high dose therapy), blood culture and sensitivity x 2, SMA 7.

Fluids and Electrolytes

Dehydration

1. Admit to:
2. Diagnosis: Dehydration
3. Condition:
4. Vital signs: Call MD if:
5. Activity:
6. Nursing: Inputs and outputs, daily weights. Urine specific gravity q void.
7. Diet:
8. IV Fluids:

Maintenance Fluids:

<10 kg	100 ml/kg/24h
10-20 kg	1000 ml plus 50 ml/kg/24h for each kg >10 kg
>20 kg	1500 ml plus 20 ml/kg/24h for each kg >20 kg.

Electrolyte Requirements:

Sodium 3-5 mEq/kg/day
Potassium 2-3 mEq/kg/day
Chloride 3 mEq/kg/day
Glucose 5-10 gm/100 ml water required

Clinical Signs of Fluid Deficit Status:

Mild 5-7%. Fluid deficit <50 ml/kg	Tachycardia, normal blood pressure, slightly dry mucous membranes; increased thirst, decreased tears, fontanelle flat; skin turgor and eyes are normal; decreased urine output, increased urine specific gravity.
Moderate 5-10%. Fluid deficit 50-100 ml/kg.	Increased severity of above plus decreased skin turgor, oliguria, irritability, dry mucous membranes, increased thirst, postural hypotension, elevated pulse, sunken fontanelle, absent tears, sunken eyes, increased BUN.

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Severe >10%. Fluid deficit ≥100 ml/kg	Hypotension, tachycardia, parched mucous membranes, very sunken eyes, delayed capillary refill (>3 sec), acidosis, decreased bicarbonate, hyperirritability, lethargy, skin tenting, anuria.
--	--

Electrolyte Deficit Calculation:

Na^+ deficit = (desired Na - measured Na in mEq/L) $\times 0.6 \times \text{weight in kg}$

K^+ deficit = (desired K - measured K in mEq/L) $\times 0.25 \times \text{weight in kg}$

Cl^- deficit = (desired Cl - measured Cl in mEq/L) $\times 0.45 \times \text{weight in kg}$

Free H₂O deficit in hypernatremic Dehydration = 4 ml/kg for every mEq that serum Na >145 mEq/L.

Phase 1, Acute Fluid Resuscitation (Symptomatic Dehydration):

- Give NS at 20-30 ml/kg IV over 60 min; may repeat fluid boluses of NS, 20-30 ml/kg, until adequate circulation. If in shock, give at max rate until stable.

Phase 2, Deficit and Maintenance Therapy (Asymptomatic dehydration):

Hypotonic Dehydration ($\text{Na}^+ < 125 \text{ mEq/L}$):

- Calculate total maintenance and deficit fluids and sodium deficit for 24h (minus fluids and electrolytes given in Phase 1). If isotonic or hyponatremic dehydration, replace 50% over 8h, 50% over next 16h.
- Estimate and replace ongoing losses q6-8h.
- Add potassium to IV solution after first void.
- Usually D5 0.45% or D5 0.25% saline with 10-40 mEq KCL/liter at 60 ml/kg over 2 hours. Then infuse at 6-8 ml/kg/h for 12h.
- See "hyponatremia," page 93.

Isotonic Dehydration ($\text{Na}^+ 130-150 \text{ mEq/L}$):

- Calculate total maintenance and replacement and electrolytes fluids for 24h (minus fluids and electrolytes given in Phase 1) and give half over first 8h, then remaining half over next 16 hours.
- Add potassium to IV solution after first void.
- Estimate and replace ongoing losses.
- Usually D5 1/2 NS or D5 1/4 NS with 10-40 mEq KCL/L.

Hypertonic Dehydration ($\text{Na}^+ > 150 \text{ mEq/L}$):

- Calculate and correct free water deficit and correct slowly. Lower sodium by 10 mEq/L/day; avoid causing a decline in sodium of more than 15 mEq/L/24h or by >0.5 mEq/L/hr.
- If volume depleted, give NS 20-40 ml/kg IV until adequate circulation, then give 1/2-1/4 NS in 2.5-5% dextrose to replace half of free water deficit over first 24h. Follow serial serum sodium levels and correct deficit over 48-72h.

-**Free water deficit:** $4 \text{ ml/kg} \times (\text{Serum Na}^+ - 145)$

-Also see "hypernatremia" page 93.

-If indicated, add potassium to IV solution after first void as KCL.

-Usually D5 1/4 NS or D5W with 10-40 mEq/L KCL. Estimate and replace ongoing losses and maintenance.

Replacement of ongoing losses (usual fluids):

-Nasogastric suction: D5 1/2 NS with 20 mEq KCL/L or 1/2 NS + KCL 20 mEq/L.

-Diarrhea: D5 1/4 NS with 40 mEq KCL/L

Oral Rehydration Therapy (mild-moderate dehydration < 10%):

-Oral rehydration electrolyte solution (Rehydralyte, Pedialyte, Ricelyte, Revital Ice) deficit replacement of 60-80 ml/kg PO or via NG tube over 2h. Provide additional fluid requirement over remaining 18-20 hours; add anticipated fluid losses from stools of 10 ml/kg for each diarrheal stool.

Oral Electrolyte Mixtures

Product	Na (mEq/L)	K (mEq/L)	Cl (mEq/L)
Rehydralyte	75	20	65
Ricelyte	50	25	45
Pedialyte	45	20	35

Hyperkalemia

1. Admit to: Pediatric ICU

2. Diagnosis: Hyperkalemia

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing: Continuous ECG monitoring, inputs and outputs, daily weights.

7. Diet:

8. IV Fluids:

Hyperkalemia (K+ > 7 or EKG Changes)

-Calcium gluconate 50-100 mg/kg (max 1 gm) IV over 5-10 minutes or calcium chloride 10-20 mg/kg (max 1 gm) IV over 10 minutes.

-Sodium bicarbonate 1-2 mEq/kg IV over 3-5 min (give after calcium in separate IV), repeat in 10-15 min if necessary.

-Regular insulin 0.1 u/kg plus Glucose 0.5 gm/kg IV bolus (as 10% dextrose).

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- Furosemide (Lasix) 1 mg/kg/dose (max 40 mg IV) IV q6-12h prn, may increase to 2 mg/kg/dose IV [inj: 10 mg/ml]
- Kayexalate resin 0.5-1 gm/kg PO/PR. 1 gm resin binds approximately 1 mEq K+.
- Consider hemodialysis.

9. Extras and X-rays: ECG, dietetics, nephrology consults.

10. Labs: SMA7, Mg, calcium, CBC, platelets. UA; urine potassium.

Hypokalemia

- 1. Admit to:** Pediatric ICU
- 2. Diagnosis:** Hypokalemia
- 3. Condition:**
- 4. Vital signs:** Call MD if:
- 5. Activity:**
- 6. Nursing:** ECG monitoring, inputs and outputs, daily weights.
- 7. Diet:**
- 8. IV Fluids:**

Hypokalemia

If serum K >2.5 and ECG changes are absent:

Add 20-40 mEq KCL/L to maintenance IV fluids. May give 1-4 mEq/kg/day as needed to maintain normal serum potassium. May supplement with oral potassium.

K <2.5 and ECG abnormalities:

Give KCL 1-2 mEq/kg IV; recommended rate: 0.5 mEq/kg/h; max rate 1 mEq/kg/h in life-threatening situations; max 20 mEq/h. Recheck serum potassium, and repeat IV boluses prn; ECG monitoring required.

Oral Potassium Therapy:

-KCL elixir 1-3 mEq/kg/day PO q8-24h [10% sln = 6.7 mEq K+/5 ml].

9. Extras and X-rays: ECG, dietetics, nephrology consults.

10. Labs: SMA7, Mg, calcium, CBC. UA, urine potassium.

Hypernatremia

- 1. Admit to:**
- 2. Diagnosis:** Hypernatremia
- 3. Condition:**
- 4. Vital signs:** Call MD if:
- 5. Activity:**
- 6. Nursing:** Inputs and outputs, daily weights.
- 7. Diet:**
- 8. IV Fluids:**

If volume depleted or in shock, give NS 20-40 ml/kg IV until adequate circulation, then give D5 1/2 NS IV to replace half of body water deficit over first 24h. Correct serum sodium slowly at 0.5-1 mEq/L/h. Correct remaining deficit over next 48-72h.

Body water deficit (L) = 0.6 (weight kg)(Na serum-140)

Hypernatremia with ECF Volume Excess:

- Furosemide (Lasix) 1 mg/kg IV.
- D5W or other hypotonic fluid to correct body water deficit.
- 9. Extras and X-rays:** ECG.
- 10. Labs:** SMA 7, osmolality, triglycerides. UA, urine specific gravity; 24h urine Na, K, creatinine.

Hyponatremia

- 1. Admit to:**
- 2. Diagnosis:** Hyponatremia
- 3. Condition:**
- 4. Vital signs:** Call MD if:
- 5. Activity:**
- 6. Nursing:** Inputs and outputs, daily weights.
- 7. Diet:**
- 8. IV Fluids:**

Hyponatremia with increased ECF and edema (Hypervolemia)(low osmolality <280, urine sodium <10 mMol/L: nephrosis, CHF, cirrhosis; urine sodium >20: acute/chronic renal failure):

- Water restrict half maintenance. No added salt diet.
- Furosemide (Lasix) 1 mg/kg/dose IV over 1-2min or 2-3 mg/kg/day PO q8-24h.

94 Hyponatremia

Hyponatremia with Isovolemia (low osmolality <280, urine sodium <10 mMol/L: water intoxication; urine sodium >20 mMol/L: SIADH, hypothyroidism, renal failure, Addison's disease, stress, drugs):

- 0.9% saline with 20-40 mEq KCL/L infused to correct at rate of <0.5 mEq/L/h **OR** use 3% NS in severe hyponatremia [3% NS = 513 mEq/liter].

-Water restrict to 1/2 maintenance.

Hyponatremia with Hypovolemia (low osmolality <280) urine sodium <10 mMol/L: vomiting, diarrhea, 3rd space/respiratory/skin loss; urine sodium >20 mMol/L: diuretics, renal injury, renal tubular acidosis, adrenal insufficiency, partial obstruction, salt wasting:

- If volume depleted, give NS 20-40 ml/kg IV until adequate circulation.
- Gradually correct sodium deficit in increments of 10 mEq/L. Determine volume deficit clinically and determine sodium deficit as below.
- Calculate 24 hour fluid and sodium requirement and give half over first 8h, then remainder over 16 hours. 0.9% saline = 154 mEq/L
- Usually D5NS 60 ml/kg IV over 2h (this will increase extracellular Na by 10 mEq/L), then infuse at 6-8 ml/kg/hr x 12h.

Severe Symptomatic Hyponatremia:

- If volume depleted, give NS 20-40 ml/kg until adequate circulation.
- Determine vol of 3% hypertonic saline (513 mEq/L) to be infused as follows:

$$\text{Na(mEq) deficit} = 0.6 \times (\text{wt kg}) \times (\text{desired Na} - \text{actual Na})$$

$$\text{Volume of sln (L)} = \frac{\text{Sodium to be infused (mEq)}}{\text{mEq/L in solution}}$$

- Correct half of sodium deficit slowly over 24h.
- For acute correction, the serum sodium goal is 125 mEq/L; max rate for acute replacement 1 mEq/kg/hr. Serum Na should be adjusted in increments of 5 mEq/L to reach 125 mEq/L. First dose usually given over 4 hrs. For further correction for serum sodium to above 125 mEq/L, calculate mEq dose of sodium and administer over 24-48h. Changes in sodium of greater than 10 mEq/L/day are not recommended

9. Extras and X-rays: CXR, ECG.

10. Labs: SMA 7, osmolality, triglyceride. UA, urine specific gravity. Urine osmolality, Na, K; 24h urine Na, K, creatinine.

Hypophosphatemia

Indications for Intermittent IV Administration:

1. Serum phosphate <1.0 mg/dL or
2. Serum phosphate <2.0 mg/dL and patient symptomatic or
3. Serum phosphate <2.5 mg/dL and patient on ventilator

<u>Dosage</u>	<u>Serum Phosphate</u>	
Low dose	0.08 mm/kg IV over 6 hrs	
Intermediate dose	0.16 mm/kg IV over 6 hrs 0.24 mm/kg IV over 4 hrs	0.5-1 mg/dL
High Dose	0.36 mm/kg IV over 6 hrs	<0.5 mg/dL

Choose Cation:

Sodium phosphate: Contains sodium 4 mEq/ml, phosphate 3 mMol/ml
 Potassium phosphate: contains potassium 4.4 mEq/ml, phosphate 3 mMol/ml
 Max rate 0.06 mEq/kg/hr

Hypomagnesemia

Indications for Intermittent IV Administration:

1. Serum magnesium <1.2 mg/dL;
2. Serum magnesium <1.6 mg/dL and patient symptomatic;
3. Calcium resistant tetany

Dosage of Magnesium Sulfate:

25-50 mg/kg/dose (0.2-0.4 mEq/kg/dose) IV every 4-6 hrs x 3-4 doses as needed (max 2000 mg = 16 mEq/dose); max rate 1 mEq/kg/hr (125 mg/kg/hr).

IV maintenance dose MgSO4: 1-2 mEq/kg/day (125-250 mg/kg/day)

Newborn Care

Neonatal Resuscitation

APGAR Score

Sign	0	1	2
Heart Rate per minute	Absent	Slow (<100)	>100
Respirations	Absent	Slow, irregular	Good, crying
Muscle Tone	Limp	Some flexion	Active motion
Reflex irritability (catheter in nares)	No response	Grimace	Cough or sneeze
Color	Blue or pale	Pink body with blue extremities	Completely pink

Assess APGAR score at 1 minute and 5 minutes, then continue assessment at 5 minute intervals until APGAR >7.

General Measures:

1. Review history, check equipment, oxygen, masks, laryngoscope, ET tubes, medications.

Vigorous, Crying Infant:

1. Routine delivery room care; heart rate > 100 beats per minute, spontaneous respirations, good color and tone.
2. Aspirate mouth then nose gently using bulb syringe; dry skin and maintain neutral thermal environment.

Moderate Depression:

1. If respiratory efforts are present but skin is pale or cyanotic, provide 100% oxygen by mask or blowby.
If **Meconium** is 2+ or more, or if in respiratory distress, intubate immediately and suction trachea until clear (do not positive pressure ventilate until trachea has been suctioned).
2. If no improvement or if clinical condition deteriorates, bag and mask ven-

tilate with intermittent positive pressure using 100% FiO₂; stimulate vigorously by drying. Initial breath pressure: 30-40 cm H₂O for term infants, 20-30 cm H₂O for pre-term infants. Then ventilate at 15-20 cm H₂O at 30-40/breaths per minute. Monitor bilateral breath sounds and expansion.

3. If spontaneous respirations develop and heart rate is normal, gradually reduce ventilation rate until only using continuous positive airway pressure (CPAP). Wean to blowby oxygen, but continue blowby oxygen if baby remains dusky.
4. Consider intubation if heart rate remains <100 beats per minute and is not rising, or if respirations are poor and weak, or for airway control.

Severe Depression:

1. Bag and mask ventilate with intermittent positive pressure using 100% FiO₂.
2. If heart rate does not increase to >60 beats per minute after 30 seconds of ventilation, initiate external cardiac compressions at 120 beats per min. May discontinue cardiac compressions when heart rate is >80 beats per minute and rising. If condition improves, change to CPAP by mask using 100% FiO₂, then change to blowby oxygen as tolerated.
3. If condition worsens or if there is no change after 30 seconds, or if mask ventilation is difficult: use laryngoscope to suction oropharynx and trachea, and intubate. Apply positive pressure ventilation. Check bilateral breath sounds and chest expansion. Check and adjust ET tube position if necessary. Continue cardiac compressions if heart rate remains depressed. Check CXR for tube placement.

Hypotension or Bradycardia:

1. Epinephrine 0.1-0.3 ml/kg = 0.01-0.03 mg/kg (0.1 mg/ml = 1:10,000) IV or ET q3-5min. Dilute ET dose to 2-3 ml in NS. If infant fails to respond, consider increasing dose to 0.1 mg/kg (0.1 ml/kg of 1 mg/ml = 1:1000).

Hypovolemia: Insert umbilical vein catheter and give O negative blood, plasma, 5% albumin or normal saline, 10 ml/kg IV over 5-10 minutes. May repeat as necessary to correct hypovolemia.

Severe Birth Asphyxia, Mixed Respiratory/Metabolic Acidosis (not responding to ventilatory support; pH <7.2):

1. Sodium Bicarbonate, 1 mEq/kg, dilute 1:1 in sterile water IV q5-10min as indicated. Bicarbonate may be given for documented as well as suspected acidosis.

98 Suspected Neonatal Sepsis

Narcotic-Related Depression:

1. Naloxone (Narcan) 0.1 mg/kg = 0.25 ml/kg (0.4 mg/ml concentration) or 0.1 ml/kg (1 mg/ml concentration) ET/IV/IM/SC, may repeat q2-3 min. Caution: May cause withdrawal and seizures in infant if the mother is a drug abuser.
2. Repeat administration may be necessary since the duration of action of naloxone may be shorter than the duration of action of the narcotic.

Intubation:

Premature infant <1.25 kg (2 lbs) 2.5 mm tube; size 0 blade; 7.5 cm tip to lip.

Premature 1.25-2 kg (2-5 lbs) 3 mm tube; 0 blade; 8 cm tip to lip.

Full term > 2 kg (5 lb) 3.5 mm tube; 1 blade; 8.5 cm tip to lip.

Suspected Neonatal Sepsis

Newborn Infants <1 month old (group B strep, E coli, or group D strep, gram negatives, Listeria monocytogenes):

Ampicillin and gentamicin **OR** ampicillin and cefotaxime

Add vancomycin if >7 days old and has central line.

Neonatal Dosage of Ampicillin: (IV, IM)

<1200 gm 0-4 weeks

100 mg/kg/day q12h

1200-2000 gm

≤7d: 100 mg/kg/day q12h

>7d: 150 mg/kg/day q8h

>2000 gm

≤7d: 150 mg/kg/day q8h

>7d: 200 mg/kg/day q6h

Cefotaxime (Claforan): (IV/IM)

<1200 grams: 0-4 wks: 100 mg/kg/day q12h

> 1200 grams: 0-7 days: 100 mg/kg/day q12h

>7 days: 150 mg/kg/day divided q8h

Gentamicin/Tobramycin: 2.5 mg/kg/dose IV/IM

Dosing Interval:

Gestational Age <28 wks and ≤ 7 days old: q24h; >7 days: q18h

28-34 wks and ≤ 7 days old: q18h; >7 days: q12h

>34 wks and < 30 days: q12 h

Neonatal Vancomycin Dosage: (IV)

Wt< 1.5 kg and age <7 days: 15 mg/kg/day q24h

Wt< 1.5 kg and age 7-30 days: 20 mg/kg/day q12h

Wt< 1.5 kg and age >30 days: 30 mg/kg/day q8h

Wt 1.5-2 kg and age <7 days: 20 mg/kg/day q12h

Wt 1.5-2 kg and age 7-30 days:	20 mg/kg/day q12h
Wt 1.5-2 kg and age >30 days:	30 mg/kg/day q8h
Wt >2 kg and age <7 days:	20 mg/kg/day q12h
Wt >2 kg and age 7-30 days:	30 mg/kg/day q8h
Wt >2 kg and age >30 days:	40 mg/kg/day q6h

Note: If serum creatinine is >1.2 mg/dL, use an initial dosage of 15 mg/kg/day q24h and determine serum vancomycin concentrations within 24-48 hours.

Nafcillin: (IV, IM)

<1200 gm	
	0-4 weeks 50 mg/kg/day q12h
1200-2000 gm	
	≤ 7 days: 50 mg/kg/day q12h
	>7 days: 75 mg/kg/day q8h
>2000 gm	
	≤ 7 days: 75 mg/kg/day q8h
	>7 days: 100 mg/kg/day q6h

Mezlocillin: (IV, IM)

<1200 gm	
	0-4 weeks 150 mg/kg/day q12h
1200-2000 gm	
	≤ 7 days: 150 mg/kg/day q12h
	>7 days: 225 mg/kg/day q8h
>2000 gm	
	≤ 7 days: 150 mg/kg/day q12h
	>7 days: 225 mg/kg/day q8h

Amikacin: 7.5 mg/kg/dose IV/IM

Dosing interval:

Gestational Age <28 wks and ≤ 7 days old: q24h; >7 days: q18h
 28-34 wks and ≤ 7 days old: q18h; >7 days: q 12h
 >34 wks and <30 d: q12h

Laboratory Studies: CBC, SMA 7, blood culture and sensitivity; UA, culture and sensitivity, antibiotic levels. CXR. Nasopharyngeal washings for direct fluorescent antibody and viral cultures. Urine antigen screen.

CSF Tube 1 - Gram stain, bacterial culture and sensitivity, antigen screen (1-2 ml).

CSF Tube 2 - Glucose protein (1-2 ml).

CSF Tube 3 - Cell count and differential (1-2 ml).

Respiratory Distress Syndrome

1. Provide mechanical ventilation as indicated.

2. Exogenous surfactant:

-Beractant (Survanta) 4 ml/kg (birth weight) via endotracheal tube as soon as possible after clinical diagnosis is suspected, then q6h up to 4 doses. Use birth weight for all doses.

-Exosurf 5 ml/kg (birth weight) via endotracheal tube as soon as possible after clinical diagnosis is suspected, then q12h for 2-3 doses total. Use birth weight for all doses

Necrotizing Enterocolitis

Treatment:

1. Decompress bowel with a large-bore (10 or 12 French) double lumen nasogastric or orogastric tube and apply intermittent suction.

2. Replace fluid losses with IV fluids; monitor urine output, tissue perfusion and blood pressure; consider central line monitoring.

3. Give blood and blood products for anemia, thrombocytopenia, coagulopathy.

4. Monitor abdominal X-rays for free air from perforation.

5. Antibiotics:

-Ampicillin and gentamicin or tobramycin or cefotaxime

Consider adding vancomycin if central line present

6. Diagnostic Evaluation: Serial abdominal X-ray series (with lateral decubitus), CBC with differential and platelets; DIC panel, blood cultures x 2; consider abdominal paracentesis; Wright's stain of stool; stool cultures.

7. Frequent Evaluations for perforation, electrolyte disturbances, and pneumatosis intestinalis and portal vein gas (X-ray). Surgical evaluation if perforation suspected.

Apnea

1. Admit to:

2. Diagnosis: Apnea

3. Condition:

4. Vital signs: Call MD if:

5. Activity:

6. Nursing: Maintain isolette at neutral thermal environment. Heart rate monitor, impedance apnea monitor, pulse oximeter. Keep bag and mask

resuscitation equipment at bed side. Rocker bed or oscillating water bed prn.

7. Diet:**8. IV Fluids:****9. Special Medications:****Apnea of Prematurity/Central Apnea:**

-Aminophylline: loading dose 5 mg/kg IV, then maintenance 5 mg/kg/day IV q12h **OR**

-Theophylline: loading dose 5 mg/kg PO, then 5 mg/kg/day PO q12h. Monitor levels.

-Caffeine citrate: Loading dose 10-20 mg/kg PO, then 5 mg/kg/day PO q12-24h; not commercially available in liquid form but may be compounded into a suspension. Monitor levels.

Note: As infant grows and matures, doses and intervals will need to be changed.

Aminophylline 5-10 mg/kg/day IV q8-12h

Theophylline 5-10 mg/kg/day PO q8-12h

Caffeine 5-10 mg/kg/day PO q8-12h

10. Extras and X-rays: Pneumogram, cranial ultrasound. Upper GI (rule out reflux), pH probe. EEG (rule out seizure).**11. Labs:** CBC, SMA 7, glucose, calcium, theophylline level, caffeine level, urine drug screen.

Congenital Syphilis

-Penicillin G aqueous: 50,000 U/kg/dose IV/IM; 0-7 days: q12h; >7 d: q8h.

Treat for 10-14 days. If one or more days is missed, restart entire course
OR

-Procaine penicillin G 50,000 u/kg/day IM qd for 10-14 day.

NOTE: Obtain follow-up serology at 3, 6, 12 months until nontreponemal test is non-reactive. Infectious skin precautions should be taken.

Congenital Herpes Simplex Infection

-Acyclovir (Zovirax) 30 mg/kg/day IV q8h. Infuse each dose over 1 hr x 14-21 days. Infants with ocular involvement should also receive a topical ophthalmic drug.

-Trifluridine ophthalmic solution (Viroptic) 1 drop in each affected eye q2h while awake [1%: 7.5 ml bottle].

Patent Ductus Arteriosus

Treatment:

1. Consider fluid restriction if symptomatic, and individualize fluid therapy based on individual patient response.
2. Provide respiratory support, maintain hematocrit at 40%, consider diuretics.
3. Furosemide (Lasix) 1-2 mg/kg/dose q6-8h PO **OR** 1 mg/kg/dose IV q12h if needed.
4. **Indomethacin (Indocin):**

Three dose course: (mg/kg/dose)

Age at First Dose	Dose 1	Dose 2	Dose 3
<48h	0.2	0.1	0.1
2-7d	0.2	0.2	0.2
>7d	0.2	0.25	0.25

Give q12-24h IV over 20-30 min. Check serum creatinine and urine output prior to each dose.

Five dose course:

0.1 mg/kg/dose IV q24h x 5 days. Check serum creatinine and urine output prior to each dose.

5. **Diagnostic Considerations:** ABG, chest X-ray, ECG, CBC, electrolytes. Ultrasound (to determine if PDA has closed).
6. Consider surgical intervention if two courses of indomethacin fail to close PDA or if indomethacin therapy is contraindicated (e.g. renal failure).
7. Cardiac consult for umbrella plug placement.

Commonly Used Formulae

Normal urine output = 50 ml/kg/day

Oliguria <1 ml/kg/hr

Normal feedings = 5 oz/kg/d

Formula = 20 calories/ounce, 24 cal/oz, 27 cal/oz

Ounce = 30 ml

Caloric Needs = 100 Kcal/kg/day

Calories/Kg = ml of formula x 30 ml/oz x 20 calories/oz divided by weight.

Weight in Kg = pounds divided by 2.2

Blood volume (ml) = 80 ml/kg x weight (kg)

Blood Products:

10 ml/kg RBC will raise hematocrit 5%

0.1 unit/kg platelets will raise platelet count by 25000/mm³.

1 U/kg of Factor VIII will raise level by 2%.

A-a gradient = [(P_B-PH₂O) FiO₂ - PCO₂/R] - PO₂ arterial

P_B = 760 mm Hg PH₂O = 47 mm Hg R = 0.8 NL <10-15 mm Hg

Arterial oxygen capacity=Hgb(gm)/100 ml x 1.36 ml O₂/gm Hgb

Arterial O₂ content = 1.36(Hgb)(SaO₂)+0.003(PaO₂)=NL 20 vol%

O₂ delivery = CO x arterial O₂ content=NL 640-1000 ml O₂/min

Cardiac output = HR x stroke volume

CO L/min = $\frac{125 \text{ ml O}_2/\text{min}/\text{M}^2}{8.5 \{(1.36)(\text{Hgb})(\text{SaO}_2) (1.36)(\text{Hgb})(\text{SvO}_2)\}} \times 100$

SVR = $\frac{\text{MAP} - \text{CVP} \times 80}{\text{CO}_{\text{L/min}}} = \text{NL } 800-1200 \text{ dyne/sec/cm}^2$

PVR = $\frac{\text{PA} - \text{PCWP} \times 80}{\text{CO}_{\text{L/min}}} = \text{NL } 45-120 \text{ dyne/sec/cm}^2$

Anion Gap = Na - (Cl + HCO₃)

Creatinine clearance = $\frac{\text{U Creatinine (mg/100 ml)} \times \text{U vol (ml)}}{\text{P Creatinine (mg/100 ml)} \times \text{time (1440 min for 24h)}}$

Normal Adult Creatinine Clearance = 100-125 ml/min (males),
85-105 (females)

Body water deficit (L) = $\frac{0.6(\text{weight kg})([\text{Na serum}]-140)}{140}$

Osmolality = $2[\text{Na} + \text{K}] + \frac{\text{BUN}}{2.8} + \frac{\text{glucose}}{18} = \text{NL } 270-290 \text{ mOsm/kg}$

Fractional excreted Na = $\frac{\text{U Na/Serum Na}}{\text{U Creatinine/Serum Creatinine}} \times 100 = \text{NL} < 1\%$

Corrected = $\frac{\text{measured Na} + \text{serum glucose (mg/dL)}}{\text{serum Na+}} = \text{NL } 140 \text{ mEq/L}$

Corrected = measured Ca + $0.8 \times (4 - \text{albumin})$
serum Ca+

Basal energy expenditure (BEE):

Males = $66 + (13.7 \times \text{actual weight in Kg}) + (5 \times \text{height in cm}) - (6.8 \times \text{age})$

Females = $655 + (9.6 \times \text{actual weight in Kg}) + (1.7 \times \text{height in cm}) - (4.7 \times \text{age})$

Nitrogen Balance = Gm protein intake/6.25 - urine urea nitrogen - (3-4 gm/d
insensible loss)

Heart rates in normal children

<u>Age</u>	<u>Range</u>	<u>Normal</u>
Newborn to 30 mos	85-200	140
30 mos to 2 yrs	100-190	130
2 yrs to 10 yrs	60-190	80
>10 yrs	50-100	75